

000927

RECORD OF DECISION  
REMEDIAL ALTERNATIVE SELECTION

SITE

Gold Coast Oil Corporation  
Miami, Florida

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for this site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Contingency Plan (40 CFR Part 300).

The State of Florida has been consulted and concurs on the selected remedy.

STATEMENT OF BASIS

This decision is based on the Administrative Record which encompasses those documents describing the site-specific conditions and the analysis of the cost effectiveness of the remedial alternatives for the Gold Coast Oil site. The attached index (Appendix A) identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

The soil and ground water at the Gold Coast Oil site are contaminated with volatile organic compounds and heavy metals. Consultations with the Florida Department of Environmental Regulation have been conducted to determine the cleanup levels and the preferred remedial alternative.

For the soil contamination, the selected remedy includes:

- excavation of the contaminated soils and hardened waste sludges, based on the cleanup levels established;
- offsite disposal at a RCRA-approved facility of the contaminated hardened waste sludges;
- stabilization/solidification and onsite placement with a cap of the metals-contaminated soils remaining.

The selected remedy for the ground water contamination consists of:

- recovery of the contaminated ground water by means of a recovery well field and based on the cleanup levels established for the volatile organics;
- treatment of the recovered contaminated ground water to remove the contaminants of concern to a degree consistent with the preferred disposal option; and
- disposal of the treated ground water in accordance with the option determined during the design of the selected alternative (recharge to the aquifer, discharge to the POTW, or discharge to surface waters).

Non-hazardous components of this remedy include:

- repair of the chain link fence;
- removal and disposal of the storage tanks, the concrete block office and supply shed, the two abandoned automobiles and an aircraft engine, and the concrete slabs and storage saddles; and
- testing and decommissioning of the onsite supply well.

Operation and maintenance activities required to ensure the continued effectiveness of the remedy include:

- long term monitoring of source control of the soils to demonstrate stability and resistance to leaching of the treated waste block;
- long term maintenance of the cap; and
- periodic ground water monitoring to ensure that long term performance has been achieved.

#### DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principle element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the extent practicable.

Final settlement has yet to be reached between EPA and the responsible parties based on the selected remedy, however, negotiations are underway.

Date

9/11/87

Lee A. DeHihns, III, Acting Regional Administrator  
EPA - Region IV

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RECORD OF DECISION  
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

GOLD COAST OIL CORPORATION  
MIAMI  
DADE COUNTY, FLORIDA

I. SITE LOCATION AND DESCRIPTION

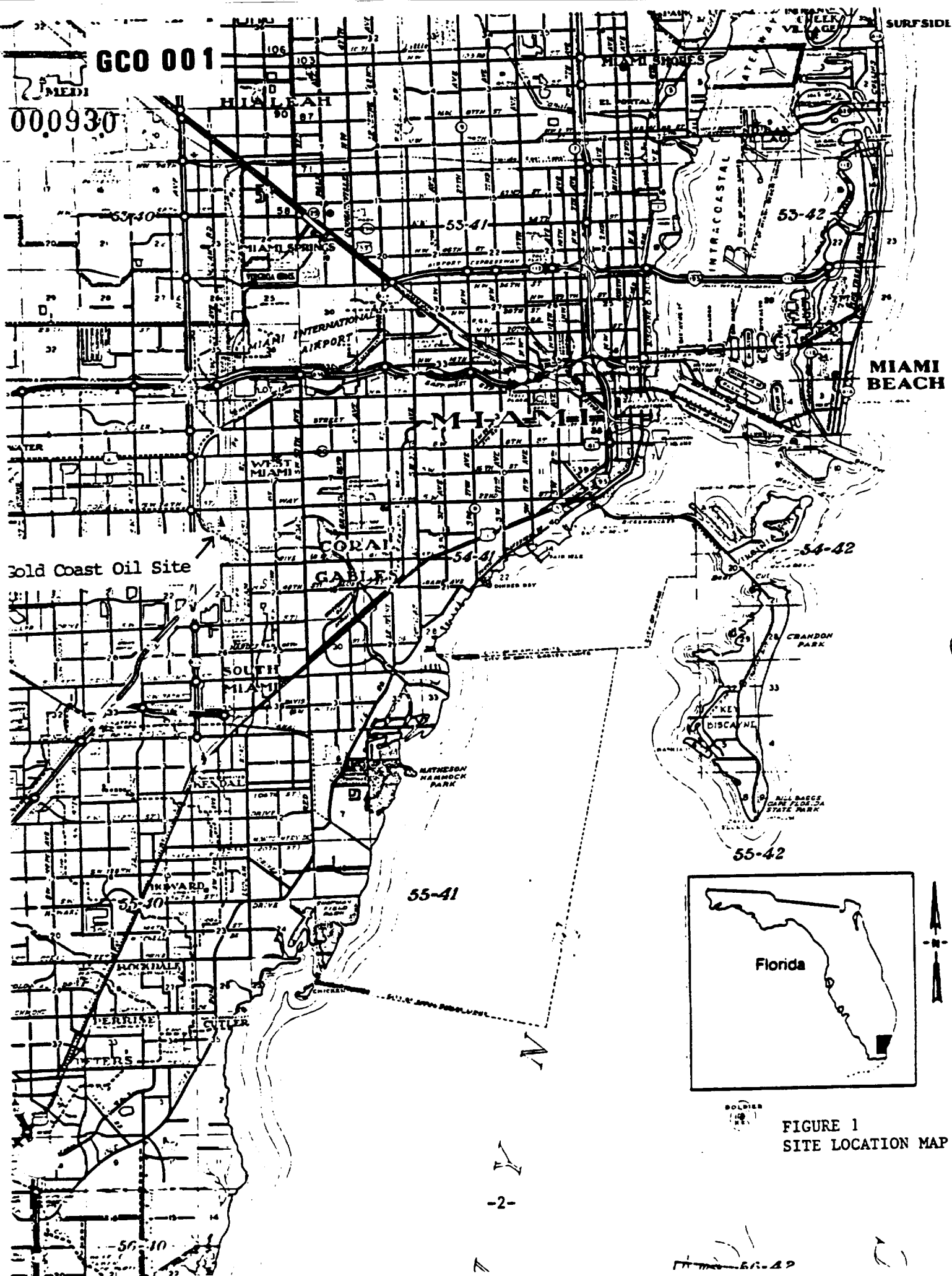
The Gold Coast Oil Corporation (GCO) site is a two acre parcel of flat, sandy land located at 2835 SW 71st Avenue, Miami, Dade County, Florida. (Figure 1) The site has no distinguishable surface drainage and is enclosed by a fence with a locking gate. It is bordered on the north and west by railroad tracks, on the south by a group of small businesses (an automotive maintenance garage, a painting shop and a cabinet shop) and on the east by SW 71st Avenue. The site operations are currently inactive. The Coral Gables Canal is approximately 850 feet south of the site on the other side of the small businesses. The canal drains to the Biscayne Bay and on to the Atlantic Ocean. The site is within the 100-year flood plain, but flooding from a canal overflow is not likely as the canal flow is regulated. The GCO site has a latitude of 25°43'40"N and a longitude of 80°18'40"W.

The GCO site property is owned by CSX Transportation, who leased it to Gold Coast Oil Corporation. Gold Coast Oil Corporation, along with Solvent Extraction Incorporated, used the site as a solvent reclamation facility. The site is within a commercial/industrial/ residential area having a population greater than 80,000 within a 3-mile radius. Groundwater within this radius is used for drinking water, irrigation, and industrial purposes. The closest private well is within 100 feet of the site and the closest public well is 3.1 miles from the site. Public drinking water is currently unavailable for only four residences within a half-mile radius of the site, therefore, private shallow wells are used for drinking water purposes.

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## II. SITE HISTORY

The site property is owned by Seaboard System Railroad Company, which is now known as CSX Transportation, who leased the property to Gold Coast Oil Corporation in the early 1970's. Gold Coast Oil, along with Solvent Extraction, Incorporated were in the business of distilling mineral spirits and lacquer thinner and reclaiming solvent. Blowdown from the operations sprayed directly onto the ground, and 53 drums of sludge-contaminated soil were stored in the southwest area of the site near the distillation unit. Still-bottom waste from the distilling operation was pumped into a tank truck for storage. There were also 2500 corroded and leaking drums containing sludge from the distilling operation, contaminated soils, and paint sludges located on site, along with large storage tanks of hazardous waste. All wastes generated by the solvent recovery operations were disposed or stored on site; no waste was shipped off-site during the 11 years of operation.

Representatives of the Dade County Department of Environmental Resources Management (DERM) took samples of illegally dumped and stored sludge, and from on-site wells at the Gold Coast Oil site on April 22, 1980. On the same day a notice to correct a waste dumping violation was issued by DERM. On November 17, 1980, DERM issued a citation to Gold Coast Oil to cease violation and an emergency order to correct a sanitary nuisance. On November 19, 1980, Gold Coast submitted Part A of the RCRA permit application to the EPA. An air pollution permit was issued to Gold Coast Oil by the Florida Department of Environmental Regulation (FDER) on December 30, 1980, for operation of an air pollution source. DERM issued a complaint for temporary, permanent, mandatory and prohibitory injunctive relief, civil damages, and civil penalties against Gold Coast Oil, on January 14, 1981. On March 16, 1981, the complaint was amended to include CSX Transportation, the owner of the property.

The DERM reported the site to the EPA in early May 1981. The EPA Surveillance and Analyses Division (SAD) conducted a sampling investigation of the site in June 1981. The SAD sampled groundwater from existing wells, soil, and waste material. In August 1981, the EPA filed a complaint against Gold Coast Oil along with a Consent Agreement and Final Order. In the fall of 1981, the Gold Coast Oil site was submitted to the EPA for inclusion on the Interim National Priority List. Two hazard ranking scores were performed. The first ranking by EPA was 58.14. The second ranking by Ecology and Environment's (E & E) Field Investigation Team (FIT) was 46.51.

Also, in October 1981, the FDER conducted a RCRA interim status inspection and reported the results to EPA. On December 1, 1981, EPA filed a Default Order against Gold Coast Oil for failing to file a timely answer to the complaint issued previously and for non-payment of the civil penalty imposed. In December 1981, an earth resistivity survey by FIT IV was conducted. In early 1982, Dade County, with the assistance of FDER, began to prepare an enforcement case against the property owner, the CSX Transportation Company, as well as the Gold Coast Oil Corporation. CSX Transportation was also advised that the EPA was going to undertake immediate removal of the

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hazardous waste on-site under the authority of CERCLA. Neither of these actions were undertaken because in June of 1982, CSX Transportation evicted Gold Coast Oil from the property and agreed to voluntarily clean up the site. In July 1982, CSX Transportation submitted for approval a cleanup and disposal plan to clean up the site's surface.

The cleanup action of the surface contaminants at the GCO site was undertaken the following month. The clean-up, conducted by Chemical Waste Management under contract to the Railroad, involved removing the drums, emptying the storage tanks and excavating and removing contaminated soils to a depth of approximately six inches.

In March 1983, the Florida Department of Environmental Regulation requested that EPA take the lead at this site, and in September 1983 the GCO site was added to the National Priority List with a 46.5 hazardous ranking score.

In June 1983, a Remedial Action Master Plan (RAMP) was developed by NUS Corporation under an EPA contract. In March 1984, BCM Eastern Incorporated, consultants for the PRP Steering Committee, produced an "Environmental Investigation of the Gold Coast Site". In June 1984 a "Draft Remedial Alternatives Evaluation Report for the Gold Coast Oil Corporation Site" was produced by Engineering and Science under an EPA contract. In May 1985 BCM Eastern submitted a "Selection of Remedial Approach" report, again a report for the PRP Steering Committee.

The Biscayne Aquifer Study area-wide ground water Record of Decision was signed by the Assistant Administrator, Office of Solid Waste and Emergency Response in September 1985. The cleanup levels established as a result of that study and that Record of Decision have been revised and approved by the Florida Department of Environmental Regulation for the Gold Coast Oil site. The cleanup levels are described in Section VIII. On July 31 and August 1, 1986, EPA's Environmental Services Division conducted a resampling of the GCO site to determine the current status of the site. In September 1986, a "Private Well Survey Report" was submitted following a well survey. The one-half mile radius well survey was conducted and reported by CDM under an EPA contract. In December 1986, a "Gold Coast Oil Site Endangerment Assessment" (EA) report was developed. The EA report was produced by CDM under an EPA contract. In January 1987 a "Gold Coast Oil Soil Cleanup Levels" report was produced by CDM under an EPA contract. In February 1987 a "Cost Estimate Report Gold Coast Oil Site" report was submitted by CDM under an EPA contract.

### III. CURRENT SITE STATUS

Operations at the Gold Coast Oil site ceased in 1982. The site is currently inactive and is enclosed by a fence with a locking gate to prohibit access to the property. However, a portion of the fence in the southwest corner has been ripped open and allows access, if desired. The site is littered with debris and has become extremely overgrown with vegetation, so much so that remedial site activity may be hindered.

The debris located on-site includes storage tanks and abandoned cars. Other non-hazardous debris has been discovered recently and, therefore, is assumed to have been discarded by access through the opening in the fence. Several large storage tanks are located throughout the site. These tanks were emptied of their waste contents as part of the 1982 surface clean-up. Two concrete slabs, an office, and a supply shed also remain on the property. These have not been in use since the eviction of Gold Coast Oil Corporation and are in a state of disorder. A plan of the site is shown in Figure 2.

Since 1980, data has been collected at the Gold Coast Oil site to determine the extent of the soil and groundwater contamination. The data was generated from waste, soil, and groundwater samples taken from the site. These studies were performed by the Dade County DERM; the U.S. EPA and their contractors, and the PRP contractor, BCM Eastern, Inc., and the data has been incorporated into several reports. These reports include the "Environmental Investigation of the Gold Coast Site, Miami, Florida" prepared by BCM Eastern, Inc. and "Draft Remedial Alternatives Evaluation Report for the Gold Coast Oil Corporation Site, Miami, Florida" prepared by Engineering-Science. The investigations have determined that the soil and groundwater are contaminated with organic compounds and heavy metals.

The general types of contaminants expected to comprise the solvent recovery operation wastes are as follows:

- spent halogenated solvents,
- spent non-halogenated solvents,
- still bottoms from the recovery of these solvents, and
- heavy metals.

Two major sampling efforts were undertaken at the GCO site following the voluntary cleanup in July 1982. The sampling efforts focused on the residual surface contamination in certain portions of the site and the quality of groundwater in the vicinity of the site.

The first sampling effort was conducted in August and in December 1983 by BCM Eastern for the PRP steering committee. Thirteen monitor wells were installed and sampled. Fifteen soil samples and two solid waste samples were taken during this study.

The second sampling effort was conducted in July 1986 by Environmental Services Division, EPA. During this effort, groundwater from seven of the 13

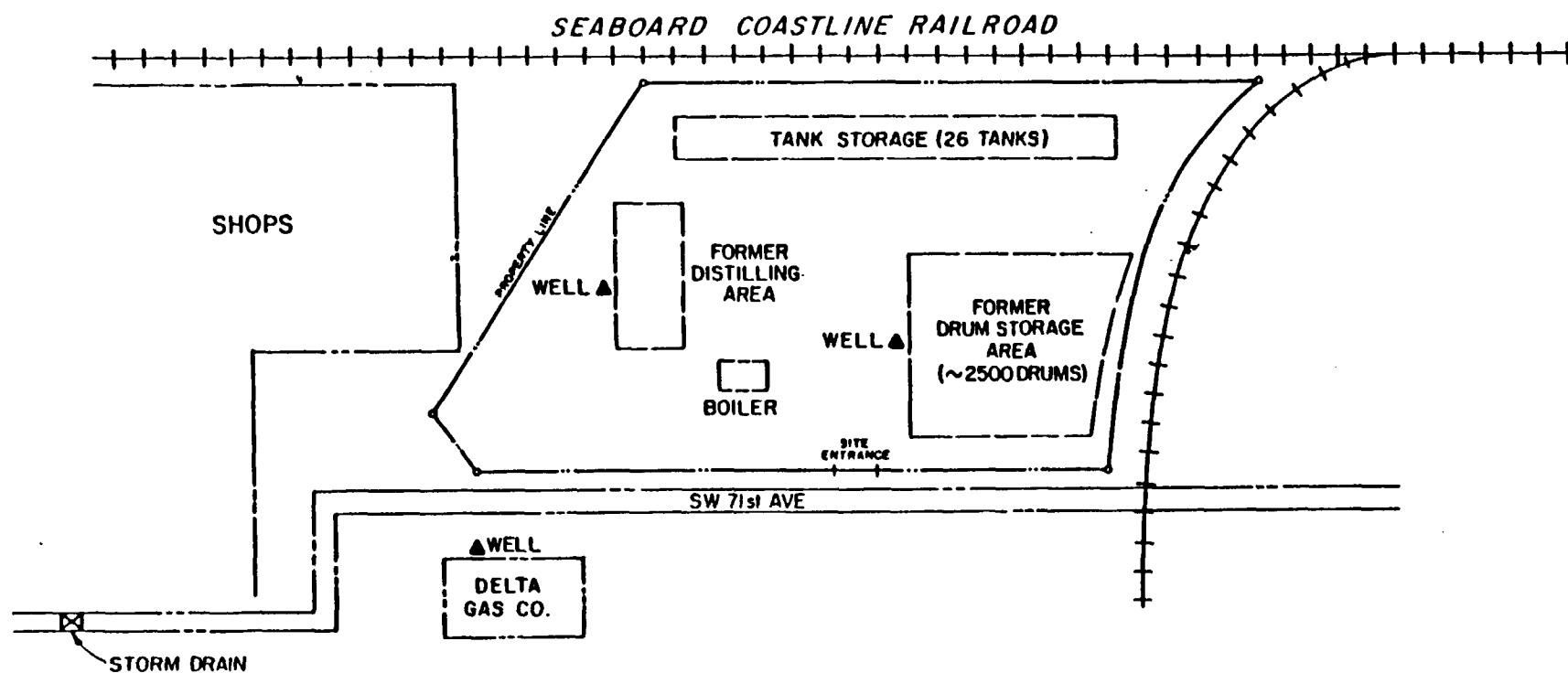


FIGURE 2

SITE PLANGOLD COAST OIL SITE, MIAMI, FL

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monitoring wells, the supply well on-site and the water well at the Delta Gas Company were sampled. Eleven soil samples were collected at various locations on site. All monitoring wells and soil sampling locations from both sampling efforts are illustrated in Figure 3.

#### Surface Soil

Analysis of surface soils obtained during 1983 indicate contaminants still remained on the surface soils following the voluntary cleanup of 1982. The results of these samples indicate the levels of organic compounds varied depending on the location, with the highest levels detected in the southeast area, the area of the former distilling operations and in the northeast area, the location of the former drum storage area (Figure 2). These areas were shown to be contaminated with high levels of chlorobenzene, 4-nitrophenol, toluene and di-(ethyl hexyl) phthalate. Tables 1 and 2 summarize the results of the organic analyses and leachate extraction (EP Toxicity test method) conducted on these surface soil samples collected in 1983.

The analysis of the samples collected in 1986 also indicate residual surface contamination. The area of highest contamination was the southwest corner identified as sample locations S-1 and S-12 (Figure 3). The contaminants in the southwest area include toluene, ethyl benzene, total xylenes, styrene and bis(2-ethyl hexyl) phthalate. Tables 3 and 4 summarize the EPA-ESD organic and inorganic analytical results of the soil samples collected in 1986.

#### Subsurface Soil

Analysis of subsurface soil samples obtained during 1983 indicates continued contamination following the 1982 cleanup. The analyses of these samples indicate the levels of organics varied with depth and location. These results are given on each summary table. Relatively high levels of organics were detected in the southwest and north section of the site. These areas were shown to be contaminated with high levels of tetrachloroethylene, trichloroethylene, toluene, 2-nitrophenol and di-(ethyl hexyl) phthalate. Tables 1 and 2 summarize results of the organic and leachate extraction (EP Toxicity test method) conducted on these samples collected in 1983.

The analysis of the samples collected in 1986 also indicated that the levels of organic compounds varied with depth and with location; however, it is evident that the organic levels have significantly reduced since the 1983 sampling episode. The highest levels of organics were detected in the southwest area of the site as identified in sample locations S-21A and S-21B (Figure 3). This area was shown to be contaminated with high levels of toluene, ethyl benzene, xylenes, styrene and bis(2-ethyl hexyl) phthalate. Elevated levels of phthalate were also present in the north central area identified in sample locations S-8 and S-8A (Figure 3). Tables 3 and 4 summarize the EPA-ESD organic and inorganic analytical results of the 1986 subsurface soil analyses.

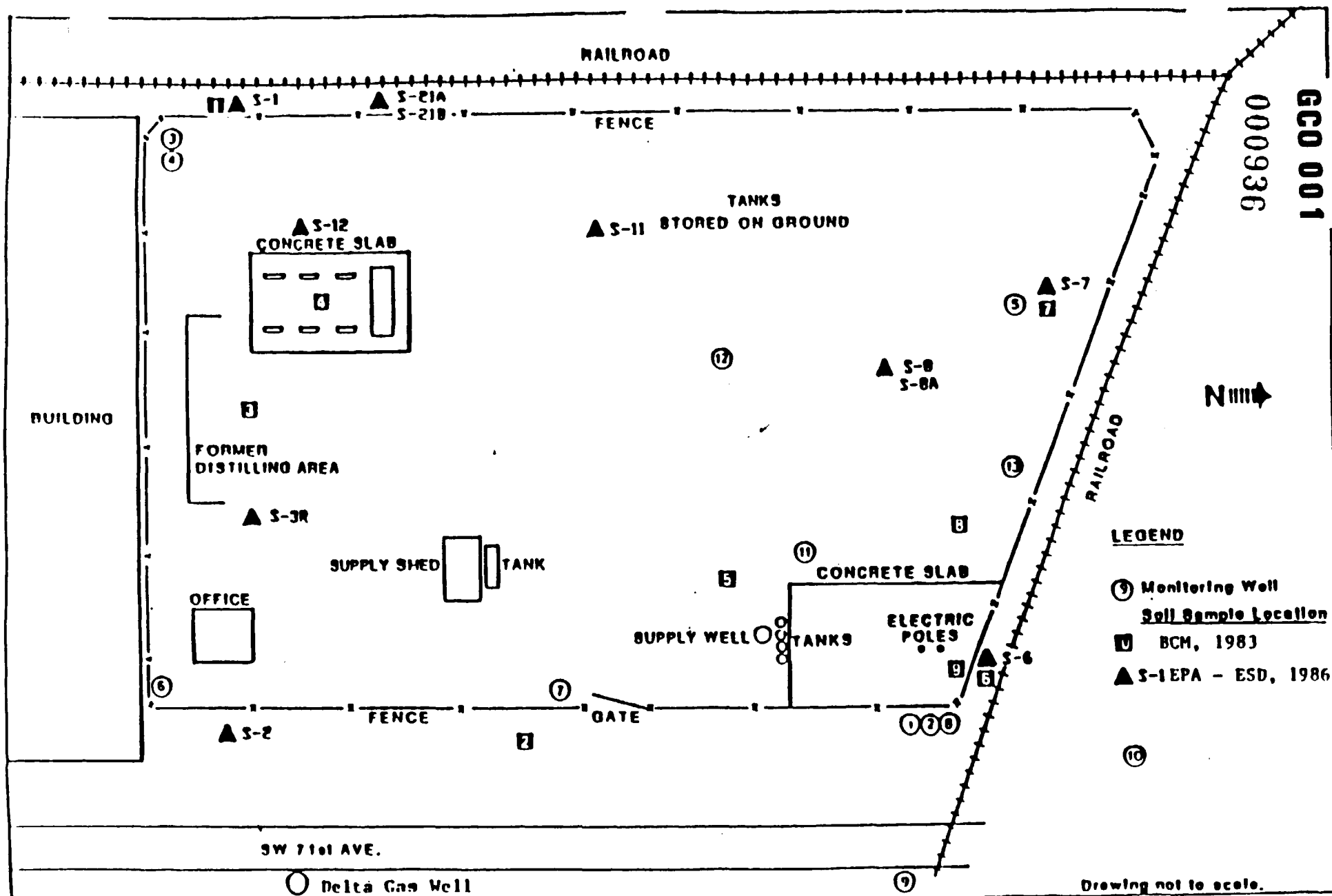


FIGURE 3 Monitor Well and Soil Sample Locations  
Gold Coast Oil Site

TABLE 1  
POSITIVE RESULTS OF ORGANIC ANALYSES OF BCM SOIL SAMPLES AT GOLD COAST OIL SITE<sup>(a)</sup>

| Contaminant               | Sample I.D.:<br>Sample Depth: |  | 1                  |             | 2       |          | 3       |           | 4       |            |
|---------------------------|-------------------------------|--|--------------------|-------------|---------|----------|---------|-----------|---------|------------|
|                           |                               |  | Surface            | 2 Inch-3 ft | Surface | 5-9 Inch | Surface | 9-19 Inch | Surface | 10-16 Inch |
| Methylene chloride        |                               |  | 0.5 <sup>(b)</sup> | 0.8         | 0.1     | 0.2      | 0.1     | 0.2       | 0.1     | ND         |
| Chloroform                |                               |  | ND                 | ND          | ND      | ND       | ND      | ND        | ND      | ND         |
| 1,1,1-Trichloroethane     |                               |  | ND                 | ND          | ND      | ND       | ND      | ND        | ND      | ND         |
| Trichloroethylene         |                               |  | ND                 | ND          | 0.6     | 0.6      | 0.4     | 0.2       | 0.2     | ND         |
| Tetrachloroethylene       |                               |  | ND                 | ND          | 0.6     | 0.5      | ND      | 0.2       | 0.2     | ND         |
| Toluene                   |                               |  | ND                 | ND          | 0.923   | 0.094    | 0.197   | 0.113     | 0.371   | ND         |
| Chlorobenzene             |                               |  | ND                 | ND          | 2.5     | ND       | ND      | 0.108     | 1.33    | 0.143      |
| Ethyl benzene             |                               |  | ND                 | ND          | 0.458   | 0.120    | ND      | 0.471     | 0.701   | 0.236      |
| 1,4-Dichlorobenzene       |                               |  | ND                 | ND          | 0.498   | 1.57     | ND      | ND        | ND      | ND         |
| 2-Nitrophenol             |                               |  | ND                 | 9.5         | 6.1     | ND       | ND      | ND        | ND      | ND         |
| Phenol                    |                               |  | ND                 | 38.0        | 17.0    | ND       | ND      | ND        | ND      | ND         |
| 2,4-Dichlorophenol        |                               |  | ND                 | 14.9        | 19.0    | ND       | ND      | ND        | ND      | ND         |
| 2,4,6-Trichlorophenol     |                               |  | ND                 | ND          | 10.6    | ND       | 23.0    | ND        | ND      | ND         |
| Pentachlorophenol         |                               |  | ND                 | ND          | 39.9    | ND       | ND      | ND        | ND      | ND         |
| 4-Nitrophenol             |                               |  | ND                 | ND          | 60.5    | ND       | ND      | ND        | ND      | ND         |
| Dimethyl phthalate        |                               |  | ND                 | ND          | ND      | ND       | 21.3    | ND        | ND      | ND         |
| Diethyl phthalate         |                               |  | ND                 | ND          | ND      | ND       | 19.0    | ND        | ND      | ND         |
| Dibutyl phthalate         |                               |  | ND                 | ND          | ND      | ND       | 106     | ND        | ND      | ND         |
| Butyl benzyl phthalate    |                               |  | ND                 | ND          | ND      | ND       | 81.5    | ND        | ND      | 12.6       |
| Di-(ethylhexyl) phthalate |                               |  | ND                 | ND          | ND      | ND       | 700     | ND        | ND      | ND         |
| Di-N-octyl phthalate      |                               |  | ND                 | ND          | ND      | ND       | ND      | ND        | ND      | ND         |

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(a) All concentrations in mg/kg. BCM Eastern samples August 4-6, 1983.

(b) ND = analyzed but not detected.

TABLE 1 - continued

| Contaminant               | Sample I.D.:  | 5       |               | 6       |         | 7          |         | 8          |  |
|---------------------------|---------------|---------|---------------|---------|---------|------------|---------|------------|--|
|                           | Sample Depth: | Surface | 16 Inch-21 ft | Surface | Surface | 15-26 Inch | Surface | 10-16 Inch |  |
| Methylene chloride        |               | ND      | ND            | ND      | ND      | 0.6        | 0.4     | 0.3        |  |
| Chloroform                |               | ND      | ND            | ND      | ND      | ND         | ND      | 1.0        |  |
| 1,1,1-Trichloroethane     |               | ND      | ND            | ND      | ND      | ND         | ND      | 1.1        |  |
| Trichloroethylene         |               | 0.1     | ND            | ND      | ND      | ND         | 0.6     | 24.0       |  |
| Tetrachloroethylene       |               | 0.3     | ND            | 0.4     | ND      | ND         | 21.0    | 360        |  |
|                           |               |         |               |         |         |            |         |            |  |
| Toluene                   |               | 27.0    | 0.131         | 0.322   | 0.138   | ND         | 4.06    | ND         |  |
| Chlorobenzene             |               | 4.25    | ND            | ND      | ND      | 0.780      | 2.13    | ND         |  |
| Ethyl benzene             |               | 5.35    | 0.136         | 0.176   | 0.147   | ND         | 3.67    | ND         |  |
| 1,3-Dichlorobenzene       |               | ND      | ND            | ND      | ND      | ND         | 0.386   | ND         |  |
| 1,4-Dichlorobenzene       |               | ND      | ND            | ND      | ND      | ND         | ND      | ND         |  |
| 1,2-Dichlorobenzene       |               | ND      | ND            | ND      | ND      | ND         | 0.243   | ND         |  |
|                           |               |         |               |         |         |            |         |            |  |
| 2-Chlorophenol            |               | ND      | ND            | ND      | ND      | 6.8        | ND      | ND         |  |
| 2-Nitrophenol             |               | ND      | ND            | ND      | ND      | 35.0       | ND      | ND         |  |
| Phenol                    |               | ND      | ND            | ND      | ND      | 26.7       | 3.7     | ND         |  |
| 2,4-Dimethylphenol        |               | ND      | ND            | ND      | ND      | 23.5       | ND      | ND         |  |
| 2,4-Dichlorophenol        |               | ND      | ND            | ND      | ND      | 21.0       | ND      | ND         |  |
| 2,4,6-Trichlorophenol     |               | 14.1    | ND            | ND      | ND      | ND         | ND      | ND         |  |
| Pentachlorophenol         |               | ND      | ND            | ND      | ND      | ND         | ND      | ND         |  |
| 4-Nitrophenol             |               | ND      | ND            | ND      | ND      | ND         | ND      | ND         |  |
|                           |               |         |               |         |         |            |         |            |  |
| Dimethyl phthalate        |               | 15.0    | ND            | ND      | ND      | ND         | 10.6    | ND         |  |
| Diethyl phthalate         |               | 43.2    | ND            | ND      | ND      | ND         | 38.4    | 92.0       |  |
| Dibutyl phthalate         |               | 35.4    | ND            | ND      | ND      | ND         | 26.5    | ND         |  |
| Butyl benzyl phthalate    |               | 43.5    | ND            | ND      | ND      | ND         | 23.5    | ND         |  |
| Di-(ethylhexyl) phthalate |               | 430     | 10.9          | 20.1    | 20.3    | ND         | 300     | 120        |  |
| Di-N-octyl phthalate      |               | ND      | ND            | <300    | ND      | ND         | ND      | ND         |  |

TABLE 2  
POSITIVE RESULTS OF LEACHATE ANALYSES OF BCM SOIL SAMPLES AT GOLD COAST OIL SITE (a)

| ANALYSES OF BCM SOIL SAMPLES AT GOLD COAST OIL SITE (a) |               |  |         |              |         |          |         |           |         |            |                               |
|---|---------------|--|---------|--------------|---------|----------|---------|-----------|---------|------------|-------------------------------|
| Contaminant   | Sample I.D.:  |  | 1       |              | 2       |          | 3       |           | 4       |            | RCRA Hazardous Waste Criteria |
|   | Sample Depth: |  | Surface | 2 Inch-3' ft | Surface | 5-9 inch | Surface | 9-19 inch | Surface | 10-16 inch |                               |
| Arsenic   |               |  | ND(b)   | ND           | ND      | ND       | 0.002   | 0.002     | 0.001   | ND         | 5.0                           |
| Barium  |               |  | ND      | ND           | ND      | ND       | ND      | ND        | ND      | ND         | 100.0                         |
| Cadmium   |               |  | 0.02    | 0.23         | 0.20    | ND       | 0.45    | ND        | 0.05    | ND         | 1.0                           |
| Chromium  |               |  | ND      | 1.13         | ND      | ND       | ND      | ND        | ND      | ND         | 5.0                           |
| Lead  |               |  | 0.165   | 2.2          | 0.62    | 0.26     | 1.6     | 0.029     | 2.3     | 0.008      | 5.0                           |
| Mercury   |               |  | 0.0003  | ND           | 0.0002  | 0.0002   | 0.0002  | 0.0002    | ND      | ND         | 0.2                           |
| Selenium  |               |  | ND      | ND           | ND      | ND       | ND      | ND        | ND      | ND         | 1.0                           |
| Silver  |               |  | ND      | ND           | ND      | ND       | ND      | ND        | ND      | ND         | 5.0                           |
| Zinc  |               |  | 1.61    | 4.25         | 1.10    | 0.37     | 4.25    | 0.33      | 0.86    | 0.07       | None                          |

| Contaminant | Sample I.D.:  |  | 5       |               | 6       |            | 7       |            | 8       |            | RCRA Hazardous Waste Criteria |
|-------------|---------------|--|---------|---------------|---------|------------|---------|------------|---------|------------|-------------------------------|
|             | Sample Depth: |  | Surface | 16 inch-21 ft | Surface | 14-26 inch | Surface | 14-26 inch | Surface | 10-16 inch |                               |
| Arsenic     |               |  | ND      | ND            | 0.002   | 0.002      | 0.002   | 0.002      | 0.003   | 0.003      | 5.0                           |
| Barium      |               |  | ND      | ND            | ND      | ND         | ND      | ND         | 0.54    | 0.45       | 100.0                         |
| Cadmium     |               |  | 0.57    | ND            | 0.15    | 0.13       | 0.64    | ND         | 0.41    | ND         | 1.0                           |
| Chromium    |               |  | ND      | ND            | ND      | ND         | ND      | ND         | ND      | ND         | 5.0                           |
| Lead        |               |  | 1.34    | ND            | 0.52    | 0.73       | 0.31    | ND         | 0.52    | 0.42       | 5.0                           |
| Mercury     |               |  | ND      | ND            | ND      | ND         | ND      | ND         | ND      | ND         | 0.2                           |
| Selenium    |               |  | 0.002   | ND            | ND      | ND         | ND      | ND         | ND      | ND         | 1.0                           |
| Silver      |               |  | ND      | ND            | ND      | ND         | ND      | ND         | ND      | ND         | 5.0                           |
| Zinc        |               |  | 1.42    | 0.16          | 2.05    | 1.22       | 0.58    | 8.42       | 0.32    | None       |                               |

0 All concentrations in mg/L. BCM Eastern samples taken.  
ND = analyzed for but not detected.

(a) All concentrations in mg/L. BCM Eastern samples taken August 4-6, 1981.  
(b) ND = analyzed for but not detected.

TABLE 3  
POSITIVE RESULTS OF ORGANIC ANALYSES OF EPA-ESD SOIL SAMPLES AT  
GOLD COAST OIL SITE<sup>(a)</sup>

| Contaminant                       | Sample I.D.:<br>Sample Depth: | S-1<br>Surface | S-2<br>2-8 inch      | S-3R<br>Surface   | S-6<br>2-8 inch     | S-7<br>8-12 inch | S-8<br>2-8 inch     | S-8A<br>12-15 inch  | S-11<br>Surface |
|-----------------------------------|-------------------------------|----------------|----------------------|-------------------|---------------------|------------------|---------------------|---------------------|-----------------|
| Toluene                           |                               | 85.0           | 0.002 <sup>(b)</sup> | ND <sup>(c)</sup> | 2.0                 | ND               | ND                  | ND                  | ND              |
| Ethyl benzene                     |                               | 180            | ND                   | ND                | ND                  | ND               | ND                  | ND                  | ND              |
| Total xylenes                     |                               | 500            | ND                   | ND                | 3.0                 | ND               | ND                  | ND                  | ND              |
| Vinyl chloride                    |                               | ND             | ND                   | ND                | 4.0                 | ND               | ND                  | ND                  | ND              |
| Trichloroethylene                 |                               | ND             | 0.007 <sup>(b)</sup> | ND                | ND                  | ND               | ND                  | ND                  | ND              |
| Styrene                           |                               | 500            | ND                   | ND                | ND                  | ND               | ND                  | ND                  | ND              |
| Methyl ethyl ketone               |                               | ND             | ND                   | ND                | 25.0 <sup>(b)</sup> | ND               | ND                  | 20.0 <sup>(b)</sup> | ND              |
| Bis(2-ethylhexyl) phthalate       |                               | 830            | ND                   | 130               | ND                  | ND               | ND                  | 12.0                | ND              |
| 1,2-Dichlorobenzene               |                               | ND             | ND                   | ND                | ND                  | ND               | 360                 | 130 <sup>(b)</sup>  | ND              |
| Naphthalene                       |                               | ND             | ND                   | ND                | ND                  | ND               | 21.0 <sup>(b)</sup> | 0.84 <sup>(b)</sup> | ND              |
| 1,3-Dichlorobenzene               |                               | ND             | ND                   | ND                | ND                  | ND               | 6.4 <sup>(b)</sup>  | 3.2 <sup>(b)</sup>  | ND              |
| 1,4-Dichlorobenzene               |                               | ND             | ND                   | ND                | ND                  | ND               | 2.6 <sup>(b)</sup>  | 1.3 <sup>(b)</sup>  | ND              |
| 1,2,4-Trichlorobenzene            |                               | ND             | ND                   | ND                | ND                  | ND               | 220                 | 8.9 <sup>(b)</sup>  | ND              |
| Benzo(B and/or K)<br>fluoranthene |                               | ND             | ND                   | ND                | ND                  | ND               | ND                  | 1.2                 | ND              |

| Contaminant                       | Sample I.D.:<br>Sample Depth: | S-12<br>Surface     | S-21A<br>5-15 inch | S-21B<br>24-38 inch |
|-----------------------------------|-------------------------------|---------------------|--------------------|---------------------|
| Toluene                           |                               | 15.0                | 32.0               | ND                  |
| Ethyl benzene                     |                               | 16.0                | 270                | 3.0 <sup>(b)</sup>  |
| Total xylenes                     |                               | 38.0                | 140                | 7.1                 |
| Vinyl chloride                    |                               | ND                  | ND                 | ND                  |
| Trichloroethylene                 |                               | ND                  | ND                 | ND                  |
| Styrene                           |                               | ND                  | ND                 | ND                  |
| Methyl ethyl ketone               |                               | 20.0 <sup>(b)</sup> | 60 <sup>(b)</sup>  | 40 <sup>(b)</sup>   |
| Bis(2-ethylhexyl) phthalate       |                               | 13.0 <sup>(b)</sup> | 560                | ND                  |
| 1,2-Dichlorobenzene               |                               | 1.2 <sup>(b)</sup>  | ND                 | ND                  |
| Naphthalene                       |                               | 2.1 <sup>(b)</sup>  | ND                 | ND                  |
| 1,3-Dichlorobenzene               |                               | ND                  | ND                 | ND                  |
| 1,4-Dichlorobenzene               |                               | ND                  | ND                 | ND                  |
| 1,2,4-Trichlorobenzene            |                               | ND                  | ND                 | ND                  |
| Benzo(B and/or K)<br>fluoranthene |                               | ND                  | ND                 | ND                  |

(a) All concentrations in mg/kg. EPA-ESD samples taken July 31, 1986 and August 1, 1986.

(b) Estimated value.

(c) ND = analyzed for but not detected.

TABLE 4  
POSITIVE RESULTS OF INORGANIC ANALYSES OF EPA-ESD SOIL SAMPLES AT  
GOLD COAST OIL SITE, EPA-ESD 1986<sup>(a)</sup>

| Contaminant | Sample I.D.:<br>Sample Depth: | S-1<br>Surface | S-2<br>2-8 inch   | S-3R<br>Surface | S-6<br>2-8 inch | S-7<br>8-12 inch   | S-8<br>2-8 inch | S-8A<br>12-15 inch | S-11<br>Surface | S-12<br>Surface | S-21A<br>5-15 inch | S-21B<br>24-38 inch |
|-------------|-------------------------------|----------------|-------------------|-----------------|-----------------|--------------------|-----------------|--------------------|-----------------|-----------------|--------------------|---------------------|
| Barium      |                               | 92             | 14                | 26              | 40              | 12                 | 21              | 34                 | 35              | ND              | ND                 | 2.3                 |
| Cobalt      |                               | 25             | ND <sup>(b)</sup> | ND              | ND              | 20                 | ND              | ND                 | ND              | ND              | ND                 | ND                  |
| Chromium    |                               | 200            | 26                | 65              | 9               | 25                 | 71              | 48                 | 68              | ND              | 270                | 11                  |
| Copper      |                               | 260            | 14                | 27              | 12              | 11                 | 17              | 12                 | 18              | 69              | 23                 | 1.5                 |
| Molybdenum  |                               | ND             | ND                | ND              | ND              | ND                 | ND              | ND                 | ND              | ND              | 57                 | ND                  |
| Lead        |                               | 920            | 140               | 540             | 110             | 68                 | 370             | 590                | 390             | 2,000           | 1,300              | 38                  |
| Strontium   |                               | 330            | 640               | 510             | 590             | 460                | 1,000           | 850                | 430             | 220             | 780                | 100                 |
| Titanium    |                               | 34             | 41                | 54              | 58              | 45                 | 140             | 91                 | 140             | 47              | 89                 | 31                  |
| Vanadium    |                               | 4              | 5.5               | 8               | 5               | 10                 | 8               | 10                 | 10              | 3               | 8                  | 3.2                 |
| Yttrium     |                               | 5              | 4                 | 6               | 3               | ND                 | 5               | 5                  | 6               | 4               | 5                  | 1.6                 |
| Zinc        |                               | 280            | 54                | 400             | 63              | 29                 | 28              | 35                 | 87              | 100             | 150                | 21                  |
| Aluminum    |                               | 1,600          | 1,500             | 1,800           | 3,100           | 3,200              | 2,900           | 3,400              | 2,900           | 930             | 2,000              | 2,100               |
| Manganese   |                               | 22             | 21                | 56              | 32              | 17                 | 28              | 27                 | 47              | 36              | 18                 | 9.2                 |
| Calcium     |                               | 92,000         | 150,000           | 160,000         | 100,000         | 70,000             | 200,000         | 160,000            | 170,000         | 97,000          | 190,000            | 15,000              |
| Magnesium   |                               | 1,100          | 1,600             | 2,400           | 1,100           | 750                | 1,900           | 1,500              | 2,300           | 1,400           | 1,800              | 180                 |
| Iron        |                               | 2,100          | 2,400             | 6,400           | 4,400           | 3,300              | 2,600           | 4,200              | 5,200           | 4,900           | 1,800              | 2,200               |
| Mercury     |                               | 4.8            | 0.1               | 0.69            | ND              | 8                  | 0.33            | 0.55               | 2.9             | 0.35            | 16                 | 2.9                 |
| Cadmium     |                               | 12             | 2                 | 16              | ND              | 1.2 <sup>(c)</sup> | 37              | 23                 | 6               | 8               | 4                  | ND                  |

(a) All concentrations in mg/kg. EPA-ESD samples taken July 31, 1986 and August 1, 1986.

(b) ND = analyzed for but not detected.

(c) Estimated value.

Groundwater

Thirteen (13) monitoring wells were constructed in the study by BCM Eastern for the PRP Steering Committee in 1983. These wells ranged in depths from 15 to 110 feet. Table 5 presents the locations and depths of the monitoring wells. Figure 3 also indicates the location of each well. Eleven wells were installed on-site including one well drawing water from the base of the aquifer at 110 feet, two (2) wells sampling the ground water from intermediate levels in the aquifer at 40 to 46 feet, and eight (8) wells sampling the ground water from shallow levels at 5 to 13 feet. In addition, two shallow offsite wells were installed in the northeast area. BCM Eastern also sampled the on-site water supply well and the off-site water supply well at the Delta Gas Company.

Groundwater samples were analyzed for purgeable halocarbons, purgeable aromatics, phenols and phthalate esters and nine metals. Table 6 presents BCM's organic analytical results, and Table 7 presents the inorganic analytical results.

Nine (9) groundwater samples were taken by the EPA-ESD in 1986. The wells sampled included the two intermediate depth wells, five (5) of the shallow wells, the on-site water supply well, and the off-site Delta Gas Company well. The EPA-ESD groundwater samples were analyzed from the Hazardous Substance List for purgeable organics, pesticides/PCBs and other chlorinated compounds, extractable organics and metals. EPA's organic analytical results are also presented in Table 6. Table 7 presents the inorganic contaminants detected in EPA's samples.

Concentrations of metals in groundwater sampled in both 1983 and 1986 decreased with depth of sampling. Samples from the shallow on-site wells were observed to contain higher levels and greater numbers of metals than water from the intermediate and deep wells. The concentrations of the metals in the groundwater have generally decreased between the 1983 and 1986 samplings. Arsenic, cadmium, lead, mercury, selenium and silver were detected in 1983 but not found in the 1986 samples.

In 1983, organic compounds were detected above trace concentrations in water from 8 of the 13 monitoring wells. The highest concentrations of organic compounds were found in wells located in the northeast section of the site. The contaminants present included 1,1-dichloroethane, trichloroethylene, tetrachloroethylene and trans-1,2-dichloroethylene. These organic compounds have apparently migrated to a depth greater than 40 feet as evidenced by their presence in water from the intermediate depth wells.

Organic compounds were again detected in 1986 in six of the eight monitoring wells, including one of the two intermediate depth wells, and the on-site water supply well. The compounds detected included trichloroethylene and tetrachloroethylene.



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TABLE 5  
LOCATION/DEPTH OF MONITOR WELLS

| <u>Well No.</u>     | <u>Depth, ft</u> | <u>Location</u> |
|---------------------|------------------|-----------------|
| W-1                 | 105-110          | On site NE      |
| W-2                 | 40-46            | On site NE      |
| W-3                 | 40-46            | On site SW      |
| W-4                 | 5-13             | On site SW      |
| W-5                 | 5-13             | On site NW      |
| W-6                 | 5-13             | On site SE      |
| W-7                 | 5-13             | On site SE      |
| W-8                 | 5-13             | On site NE      |
| W-9                 | 5-13             | Off site NE     |
| W-10                | 5-13             | Off site NE     |
| W-11                | 5-13             | On site NE      |
| W-12                | 5-13             | On site NW      |
| W-13                | 5-13             | On site NE      |
| On-site Supply Well | -(a)             | On site NE      |
| Delta Gas Co. Well  | -(a)             | Off site SE     |

(a) Depth unknown; assumed to be shallow wells.

TABLE 6  
POSITIVE RESULTS OF ORGANIC ANALYSES OF GROUNDWATER SAMPLES AT GOLD COAST OIL SITE<sup>(a)</sup>

| Contaminant                    | Sample Depth: (b)   |  | I      |        |                      | I      |                     | S   |        | S      |                       |   |
|--------------------------------|---------------------|--|--------|--------|----------------------|--------|---------------------|-----|--------|--------|-----------------------|---|
|                                | Well No.:           |  | W-2    |        |                      | W-3    |                     | W-4 |        | W-5    |                       |   |
|                                | Sampling Round: (c) |  | 1      | 2      | 3                    | 1      | 3                   | 1   |        | 1      | 2                     | 3 |
| Methylene chloride             | ND <sup>(d)</sup>   |  | ND     | 0.0077 | 0.013 <sup>(e)</sup> | ND     | ND                  | ND  | ND     | 0.0012 | 0.014                 |   |
| 1,1-Dichloroethylene           | ND                  |  | 0.0073 | 0.003  | 0.003 <sup>(e)</sup> | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| 1,1-Dichloroethane             | ND                  |  | 0.0106 | 0.849  | 0.0065               | ND     | ND                  | ND  | 0.0063 | 0.0014 | ND                    |   |
| trans-1,2-Dichloroethylene     | ND                  |  | 0.001  | 0.07   | ND                   | ND     | ND                  | ND  | 0.0078 | 0.012  | ND                    |   |
| 1,1,1-Trichloroethane          | ND                  |  | ND     | 0.0039 | ND                   | 0.0023 | ND                  | ND  | ND     | ND     | ND                    |   |
| Bromodichloromethane           | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| Trichloroethylene              | ND                  |  | ND     | 0.0094 | ND                   | ND     | ND                  | ND  | 0.0383 | 0.0005 | ND                    |   |
| Tetrachloroethylene            | ND                  |  | ND     | 0.0443 | ND                   | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| Chloroform                     | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| 1,2-Dichloroethane             | ND                  |  | ND     | 0.0007 | ND                   | ND     | ND                  | ND  | ND     | 0.0004 | ND                    |   |
| cis-1,3-Dichloropropene        | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| Benzene                        | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | ND     | ND     | 0.001 <sup>(e)</sup>  |   |
| Toluene                        | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| Chlorobenzene                  | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | 0.0633 | 0.122  | 0.005 <sup>(e)</sup>  |   |
| Ethylbenzene                   | ND                  |  | ND     | 0.0211 | ND                   | ND     | ND                  | ND  | ND     | ND     | 0.014                 |   |
| 1,2-Dichlorobenzene            | ND                  |  | ND     | 0.0166 | ND                   | ND     | ND                  | ND  | ND     | ND     | 0.015 <sup>(e)</sup>  |   |
| Vinyl chloride                 | ND                  |  | ND     | ND     | ND                   | ND     | 0.013               | ND  | ND     | ND     | ND                    |   |
| Chloroethane                   | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| Phenol                         | ND                  |  | ND     | ND     | ND                   | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| bis(2-Ethylhexyl)<br>phthalate | ND                  |  | ND     | ND     | 0.04                 | ND     | ND                  | ND  | ND     | ND     | ND                    |   |
| cis-1,2-Dichloroethylene       | - <sup>(f)</sup>    |  | -      | -      | ND                   | -      | 0.05 <sup>(e)</sup> | -   | -      | -      | ND                    |   |
| Ethyl ether                    | -                   |  | -      | -      | ND                   | -      | 0.02 <sup>(e)</sup> | -   | -      | -      | ND                    |   |
| Diisopropyl ketone             | -                   |  | -      | -      | ND                   | -      | ND                  | -   | -      | -      | 0.02 <sup>(e)</sup>   |   |
| Total xylenes                  | -                   |  | -      | -      | ND                   | -      | ND                  | -   | -      | -      | 0.003 <sup>(e)</sup>  |   |
| Naphthalene                    | -                   |  | -      | -      | ND                   | -      | ND                  | -   | -      | -      | 0.0054 <sup>(e)</sup> |   |
| Isophorene                     | -                   |  | -      | -      | ND                   | -      | ND                  | -   | -      | -      | ND                    |   |

continued-

(a) All concentrations in mg/L.

(b) Shallow (S = sampled 5-13 ft deep), Intermediate (I = sampled 40-46 ft deep), Deep (D = sampled 105-110 ft deep).

(c) BOM Eastern sampling dates: Round 1, August 4-6, 1983; Round 2, December 6-7, 1983. EPA-ESD Round 3 sampling date July 31, 1986.

(d) ND = analyzed for but not detected.

(e) Estimated value.

(f) - = indicated not analyzed for.

(g) Duplicate analysis.

TABLE 6 - continued

| Contaminant                    | Sample Depth:<br>Well No.: |        | S      |        | S      |                    |        | S      | S      | S                   |    |
|--------------------------------|----------------------------|--------|--------|--------|--------|--------------------|--------|--------|--------|---------------------|----|
|                                | W-6                        |        | W-7    |        | W-8    |                    |        | W-9    | W-10   | W-11                |    |
|                                | Sampling Round:            |        | 1      | 2      | 1      | 2                  | 3      | 1      | 2      | 2                   | 3  |
| Methylene chloride             | ND                         | ND     | 0.0042 | 0.005  | 0.016  | ND                 | 0.0007 | 0.0008 | 0.0012 | ND                  | ND |
| 1,1-Dichloroethylene           | ND                         | ND     | ND     | ND     | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| 1,1-Dichloroethane             | ND                         | 0.0114 | ND     | 2.0    | 2.0    | 0.1 <sup>(e)</sup> | ND     | 0.0108 | ND     | ND                  | ND |
| trans-1,2-Dichloroethylene     | ND                         | 0.0677 | 0.0003 | 0.271  | 0.138  | ND                 | 0.0008 | 0.003  | 0.0003 | ND                  | ND |
| 1,1,1-Trichloroethane          | ND                         | ND     | ND     | 0.0189 | 0.0264 | ND                 | ND     | ND     | ND     | ND                  | ND |
| Bromodichloromethane           | ND                         | ND     | ND     | ND     | ND     | ND                 | ND     | 0.0013 | ND     | ND                  | ND |
| Trichloroethylene              | ND                         | ND     | 0.0142 | 0.0184 | 0.0024 | ND                 | 0.0013 | 0.0011 | 0.0047 | ND                  | ND |
| Tetrachloroethylene            | ND                         | ND     | 0.0041 | 0.0001 | 0.0243 | ND                 | 0.0046 | 0.0055 | 0.0004 | 0.05 <sup>(e)</sup> | ND |
| Chloroform                     | ND                         | ND     | ND     | ND     | ND     | ND                 | 0.0004 | 0.0083 | 0.0007 | 0.41                | ND |
| 1,2-Dichloroethane             | ND                         | ND     | 0.0005 | ND     | 0.0024 | ND                 | ND     | 0.0002 | 0.0004 | ND                  | ND |
| cis-1,3-Dichloropropene        | ND                         | ND     | ND     | ND     | 0.0008 | ND                 | ND     | ND     | ND     | ND                  | ND |
| Benzene                        | ND                         | ND     | ND     | 0.0314 | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| Toluene                        | 0.0007                     | ND     | 0.0107 | 0.154  | 0.0372 | ND                 | 0.0307 | 0.0349 | ND     | ND                  | ND |
| Chlorobenzene                  | ND                         | ND     | ND     | 0.0501 | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| Ethylbenzene                   | ND                         | ND     | ND     | 0.0021 | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| 1,2-Dichlorobenzene            | ND                         | ND     | ND     | 0.0055 | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| Vinyl chloride                 | ND                         | ND     | ND     | ND     | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| Chloroethane                   | ND                         | ND     | ND     | ND     | ND     | 0.6                | ND     | ND     | ND     | ND                  | ND |
| Phenol                         | ND                         | ND     | ND     | ND     | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| bis(2-Ethylhexyl)<br>phthalate | ND                         | ND     | ND     | ND     | ND     | ND                 | ND     | ND     | ND     | ND                  | ND |
| cis-1,2-Dichloroethylene       | -                          | -      | -      | -      | -      | ND                 | -      | -      | -      | ND                  | ND |
| Ethyl ether                    | -                          | -      | -      | -      | -      | ND                 | -      | -      | -      | ND                  | ND |
| Diisopropyl ketone             | -                          | -      | -      | -      | -      | ND                 | -      | -      | -      | ND                  | ND |
| Total xylenes                  | -                          | -      | -      | -      | -      | ND                 | -      | -      | -      | ND                  | ND |
| Naphthalene                    | -                          | -      | -      | -      | -      | ND                 | -      | -      | -      | ND                  | ND |
| Isophorene                     | -                          | -      | -      | -      | -      | ND                 | -      | -      | -      | ND                  | ND |

continued-

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TABLE 6 - continued

| Contaminant                    | Sample Depth:<br>Well No.: |  |  | S      |    |                       | S      |                      |     | S                   |        |                      | Delta Gas |    |
|--------------------------------|----------------------------|--|--|--------|----|-----------------------|--------|----------------------|-----|---------------------|--------|----------------------|-----------|----|
|                                | Well No.:                  |  |  | W-12   |    |                       | W-13   |                      |     | On-site Supply Well |        |                      | Delta Gas |    |
|                                | Sampling Round:            |  |  | 2      | 3  | 3D <sup>(E)</sup>     | 2      | 3                    |     | 1                   | 2      | 3                    | 2         | 3  |
| Methylene chloride             |                            |  |  | 0.0016 | ND | ND                    | 0.0998 | ND                   |     | 0.0013              | 0.001  | 0.013                | ND        | ND |
| 1,1-Dichloroethylene           |                            |  |  | ND     | ND | ND                    | 0.0373 | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| 1,1-Dichloroethane             |                            |  |  | ND     | ND | ND                    | 0.3    | ND                   |     | 0.0109              | 0.0087 | ND                   | ND        | ND |
| trans-1,2-Dichloroethylene     |                            |  |  | ND     | ND | ND                    | 3.0    | ND                   |     | 0.0651              | 0.0571 | ND                   | ND        | ND |
| 1,1,1-Trichloroethane          |                            |  |  | ND     | ND | ND                    | 0.4    | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| Bromodichloromethane           |                            |  |  | ND     | ND | ND                    | 0.0032 | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| Trichloroethylene              |                            |  |  | ND     | ND | ND                    | 2.0    | 4.8                  |     | ND                  | ND     | ND                   | ND        | ND |
| Tetrachloroethylene            |                            |  |  | ND     | ND | ND                    | 10.0   | 100                  |     | ND                  | ND     | ND                   | ND        | ND |
| Chloroform                     |                            |  |  | ND     | ND | ND                    | ND     | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| 1,2-Dichloroethane             |                            |  |  | ND     | ND | ND                    | ND     | ND                   |     | ND                  | 0.0035 | ND                   | ND        | ND |
| cis-1,3-Dichloropropene        |                            |  |  | ND     | ND | ND                    | ND     | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| Benzene                        |                            |  |  | ND     | ND | ND                    | ND     | ND                   | (e) | ND                  | ND     | ND                   | ND        | ND |
| Toluene                        |                            |  |  | 0.545  | ND | ND                    | ND     | 0.2                  | (e) | ND                  | ND     | ND                   | ND        | ND |
| Chlorobenzene                  |                            |  |  | ND     | ND | ND                    | ND     | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| Ethylbenzene                   |                            |  |  | 0.0323 | ND | ND                    | ND     | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| 1,2-Dichlorobenzene            |                            |  |  | 0.153  | ND | ND                    | ND     | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| Vinyl chloride                 |                            |  |  | ND     | ND | ND                    | ND     | ND                   |     | ND                  | ND     | 0.015                | ND        | ND |
| Chloroethane                   |                            |  |  | ND     | ND | ND                    | ND     | ND                   |     | ND                  | ND     | 0.040                | ND        | ND |
| Phenol                         |                            |  |  | ND     | ND | 0.0017 <sup>(e)</sup> | ND     | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| bis(2-Ethylhexyl)<br>phthalate |                            |  |  | ND     | ND | ND                    | ND     | ND                   |     | ND                  | ND     | ND                   | ND        | ND |
| cis-1,2-Dichloroethylene       |                            |  |  | -      | ND | ND                    | -      | 2.0                  |     | -                   | -      | 0.030 <sup>(e)</sup> | -         | ND |
| Ethyl ether                    |                            |  |  | -      | ND | ND                    | -      | ND                   |     | -                   | -      | ND                   | -         | ND |
| Diisopropyl ketone             |                            |  |  | -      | ND | ND                    | -      | ND                   |     | -                   | -      | ND                   | -         | ND |
| Total xylenes                  |                            |  |  | -      | ND | ND                    | -      | ND                   |     | -                   | -      | ND                   | -         | ND |
| Naphthalene                    |                            |  |  | -      | ND | ND                    | -      | ND                   |     | -                   | -      | ND                   | -         | ND |
| Isophorene                     |                            |  |  | -      | ND | ND                    | -      | 0.015 <sup>(e)</sup> |     | -                   | -      | ND                   | -         | ND |

TABLE 7  
POSITIVE RESULTS OF METAL ANALYSIS OF GROUNDWATER SAMPLES AT GOLD COAST OIL SITE<sup>(a)</sup>

| Contaminant | Sample Depth:<br>Well No:<br>Sampling Round: | (b)     |             |       | D      | I      |       |        | I     | S      | S      |       |       | S     | S |     |     |   |   |   |   |
|-------------|--|---------|-------------|-------|--------|--------|-------|--------|-------|--------|--------|-------|-------|-------|---|-----|-----|---|---|---|---|
|             |  | On-site | Supply Well |       |        | W-1    | W-2   |        |       |        | W-3    | W-4   | W-5   |       |   | W-6 | W-7 |   |   |   |   |
|             |  |         | 1           | 2     |        |        | 3     | 1      |       |        |        |       | 3     |       |   |     |     | 1 | 3 | 1 | 3 |
|             |  |         |             |       |        |        |       |        |       |        |        |       |       |       |   |     |     |   |   |   |   |
| Aluminum    |  | (e)     | -           | ND(f) | -      | -      | ND    | -      | 0.11  | -      | -      | ND    | -     | -     |   |     |     |   |   |   |   |
| Arsenic     |  | 0.003   | -           | ND    | ND     | 0.001  | ND    | ND     | ND    | ND     | 0.002  | ND    | ND    | ND    |   |     |     |   |   |   |   |
| Barium      |  | 0.014   | -           | ND    | ND     | ND     | ND    | ND     | 0.018 | 0.207  | 0.205  | 0.021 | 0.309 | 0.111 |   |     |     |   |   |   |   |
| Cadmium     |  | 0.075   | 0.37        | ND    | 0.0013 | 0.0088 | ND    | 0.001  | ND    | ND     | 0.0005 | ND    | ND    | ND    |   |     |     |   |   |   |   |
| Calcium     |  | -       | -           | 110   | -      | -      | 79.0  | -      | 100   | -      | -      | 190   | -     | -     |   |     |     |   |   |   |   |
| Chromium    |  | ND      | -           | ND    | ND     | ND     | ND    | ND     | ND    | ND     | ND     | ND    | ND    | ND    |   |     |     |   |   |   |   |
| Copper      |  | -       | -           | ND    | -      | -      | ND    | -      | 0.018 | -      | -      | ND    | -     | -     |   |     |     |   |   |   |   |
| Iron        |  | -       | -           | 4.9   | -      | -      | 8.9   | -      | 55.0  | -      | -      | 9.0   | -     | -     |   |     |     |   |   |   |   |
| Lead        |  | 1.6     | 4.5         | ND    | 0.006  | 0.013  | ND    | 0.009  | ND    | 0.002  | 0.002  | ND    | 0.002 | ND    |   |     |     |   |   |   |   |
| Magnesium   |  | -       | -           | 3.0   | -      | -      | 1.8   | -      | 3.1   | -      | -      | 2.7   | -     | -     |   |     |     |   |   |   |   |
| Manganese   |  | -       | -           | ND    | -      | -      | 0.029 | -      | 0.30  | -      | -      | 0.061 | -     | -     |   |     |     |   |   |   |   |
| Mercury     |  | 0.0001  | -           | ND    | 0.0002 | 0.0002 | ND    | 0.0001 | ND    | 0.0002 | 0.0021 | ND    | ND    | ND    |   |     |     |   |   |   |   |
| Selenium    |  | ND      | -           | ND    | ND     | ND     | ND    | ND     | ND    | ND     | ND     | ND    | ND    | ND    |   |     |     |   |   |   |   |
| Silver      |  | ND      | -           | ND    | ND     | ND     | ND    | ND     | ND    | ND     | ND     | ND    | ND    | ND    |   |     |     |   |   |   |   |
| Sodium      |  | -       | -           | 28.0  | -      | -      | 4.4   | -      | 12.0  | -      | -      | 6.7   | -     | -     |   |     |     |   |   |   |   |
| Strontium   |  | -       | -           | 1.1   | -      | -      | 0.54  | -      | 1.1   | -      | -      | 1.7   | -     | -     |   |     |     |   |   |   |   |
| Tellurium   |  | -       | -           | ND    | -      | -      | ND    | -      | ND    | -      | -      | ND    | -     | -     |   |     |     |   |   |   |   |
| Titanium    |  | -       | -           | ND    | -      | -      | ND    | -      | ND    | -      | -      | ND    | -     | -     |   |     |     |   |   |   |   |
| Zinc        |  | 112     | 2,669       | 1.4   | 0.03   | 0.03   | ND    | 0.11   | 0.024 | ND     | 0.01   | ND    | 0.01  | 0.008 |   |     |     |   |   |   |   |

continued-

(a) All concentrations in mg/L.

(b) Shallow (2 - sampled 5-14 ft deep), Intermediate (1 - sampled 40-46 ft deep), Deep (d - sampled 105-110 ft deep).

(c) BCM Eastern sampling: Round 1, August 4-6, 1983. BCM Eastern sampling Round 2, December 6-7, 1983. EPA-ESD sampling Round 3, July 31, 1986.

(d) Duplicate analysis.

(e) - = indicates not analyzed for.

(f) ND = analyzed for but not detected.

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TABLE 7 - continued

| Contaminant | Sample Depth:   | S     |       | S     |       | S                 |       | S    |  |
|-------------|-----------------|-------|-------|-------|-------|-------------------|-------|------|--|
|             | Well No.:       | W-8   |       | W-11  |       | W-12              |       | W-13 |  |
|             | Sampling Round: | 1     | 3     | 3     | 3     | 3D <sup>(d)</sup> | 3     | Gas  |  |
| Aluminum    | -               | ND    | 0.21  | 0.21  | 0.21  | 0.54              | ND    |      |  |
| Arsenic     | ND              | ND    | ND    | ND    | ND    | ND                | ND    |      |  |
| Barium      | 0.262           | ND    | ND    | ND    | ND    | 0.025             | ND    |      |  |
| Cadmium     | 0.0005          | ND    | ND    | ND    | ND    | ND                | ND    |      |  |
| Calcium     | -               | 160   | 130   | 1,900 | 1,900 | 180               | 69.0  |      |  |
| Chromium    | ND              | ND    | ND    | 0.09  | 0.17  | ND                | ND    |      |  |
| Copper      | -               | ND    | ND    | ND    | ND    | ND                | ND    |      |  |
| Iron        | -               | 6.3   | 10.0  | 51    | 50    | 10.0              | ND    |      |  |
| Lead        | 0.003           | ND    | ND    | ND    | ND    | ND                | ND    |      |  |
| Magnesium   | -               | 4.6   | 1.4   | 22.0  | 21.0  | 3.6               | 1.2   |      |  |
| Manganese   | -               | 0.079 | 0.036 | ND    | ND    | 0.053             | ND    |      |  |
| Mercury     | ND              | ND    | ND    | ND    | ND    | ND                | ND    |      |  |
| Selenium    | ND              | ND    | ND    | ND    | ND    | ND                | ND    |      |  |
| Silver      | ND              | ND    | ND    | ND    | ND    | ND                | ND    |      |  |
| Sodium      | -               | 6.3   | 2.0   | 35.0  | 33.0  | 5.5               | 1.9   |      |  |
| Strontium   | -               | 1.4   | 1.5   | 32.0  | 31.0  | 1.6               | 0.43  |      |  |
| Tellurium   | -               | ND    | ND    | 4.0   | ND    | ND                | ND    |      |  |
| Titanium    | -               | ND    | ND    | 0.1   | 0.11  | ND                | ND    |      |  |
| Zinc        | ND              | ND    | 3.1   | 23.0  | 22.0  | 5.9               | 0.032 |      |  |

The highest concentrations were again found in two wells located in the northeast part of the site.

Table 8 provides a comparison of the organic contaminants detected in groundwater from 1983 to 1986. The data indicate that the mean concentrations of trans-1,2-dichloroethane, 1,1-dichloroethane and toluene have decreased in the shallow wells while the mean concentrations of trichloroethylene and tetrachloroethylene have increased. The mean concentration of methylene chloride in shallow wells has remained about the same, while the mean concentration of methylene chloride in the intermediate wells has increased slightly. The decrease and increase in concentrations may be attributed to the physical characteristics of the chemicals in soil, particularly mobility and volatilization.

Previous to the 1983 and 1986 groundwater sampling studies, an earth resistivity survey was conducted at the site in January 1981. The survey consisted of both areal resistivity profiles and vertical resistivity sounding. The areal resistivity profiling identified a significant resistivity anomaly at the northeast corner of the site (Figure 4). This anomaly was interpreted to be contaminated groundwater. The anomaly extended generally northeast of the site, and groundwater contamination extended to a depth greater than 30 feet at the northeast corner of the property boundary. The results of the resistivity study are confirmed by the analytical results of the 1983 and 1986 sampling studies.

In summary, the groundwater data indicate an area of significant contamination in the northeast corner of the site extending to a depth greater than 40 feet. These findings confirm the earth resistivity study anomaly that was found in 1981. The levels of contaminants have generally decreased across the site except for the levels of trichloroethylene and tetrachloroethylene which have increased in this northeast corner. The levels of metals in the groundwater are considered to be at normal environmental levels since they are relatively constant throughout the entire area of the site. Contaminants were found in the two off-site shallow monitoring wells in 1983. However, since these shallow wells were not sampled in 1986, no definitive conclusions can be reached regarding the continued movement of this contaminated groundwater off site. No contaminants were identified at the off-site deep water supply well at the Delta Gas Company.

#### Factors Affecting Migration

##### Soil/Geological Environment:

The surface material of the site consists generally of unconsolidated sandy limestone varying in thickness between two to six feet.

Underneath the Miami, Florida area are deposits of unconsolidated sand, shell and consolidated limestone, that together form the Biscayne aquifer. The base of the Biscayne Aquifer is approximately 90 to 100 feet below mean sea level in the study area. This elevation corresponds to a depth of approximately

TABLE 8  
COMPARISON OF CONTAMINANTS DETECTED IN GROUNDWATER<sup>(a)</sup>

| Contaminant              |                     | Intermediate, On-site Wells |                          | Shallow, On-site Wells |                    |
|--------------------------|---------------------|-----------------------------|--------------------------|------------------------|--------------------|
|                          |                     | BCM, 1983 <sup>(b)</sup>    | EPA, 1986 <sup>(c)</sup> | BMC, 1983              | EPA, 1986          |
|                          |                     | N=3 <sup>(d)</sup>          | N=2                      | N=13                   | N=7                |
| 1,1-Dichloroethane       | max <sup>(e)</sup>  | 0.849                       | 0.0065                   | 2.0                    | 0.1                |
|                          | mean <sup>(f)</sup> | 0.28653                     | 0.00325                  | 0.33375                | 0.014              |
|                          | s <sup>(g)</sup>    | 2                           | 1                        | 8                      | 1                  |
| trans-1,2-Dichloroethane | max                 | 0.07                        | ND <sup>(h)</sup>        | 3.0                    | ND                 |
|                          | mean                | 0.0244                      |                          | 0.27841                |                    |
|                          | s                   | 3                           |                          | 10                     |                    |
| Lead                     | max                 | 0.013 <sup>(i)</sup>        | ND                       | 4.5 <sup>(j)</sup>     | ND                 |
|                          | mean                | 0.011                       |                          | 0.87                   |                    |
|                          | s                   | 2                           |                          | 6                      |                    |
| Methylene chloride       | max                 | 0.0077                      | 0.013                    | 0.0998                 | 0.014              |
|                          | mean                | 0.00257                     | 0.065                    | 0.0101                 | 0.0135             |
|                          | s                   | 1                           | 1                        | 9                      | 2                  |
| Tetrachloroethylene      | max                 | 0.0443                      | ND                       | 10.0                   | 100                |
|                          | mean                | 0.01477                     |                          | 0.77145                | 14.34              |
|                          | s                   | 1                           |                          | 5                      | 2                  |
| Toluene                  | max                 | ND                          | ND                       | 0.545                  | 0.2 <sup>(k)</sup> |
|                          | mean                |                             |                          | 0.05751                | 0.029              |
|                          | s                   |                             |                          | 5                      | 1                  |
| Trichloroethylene        | max                 | 0.0094                      | ND                       | 2.0                    | 4.8                |
|                          | mean                | 0.00313                     |                          | 0.15988                | 0.69               |
|                          | s                   | 1                           |                          | 7                      | 2                  |

(a) All concentrations in mg/L.

(b) BCM Eastern, Inc. samples taken August 4-6, 1983 and December 6-7, 1983. Raw data provided in Appendices 6 and 7.

(c) EPA-ESD, Region IV samples taken July 31, 1986. Raw data provided in Appendices 6 and 7.

(d) N = number of samples/analyses used in calculations of the mean value.

(e) max = maximum concentration detected.

(f) mean calculated assuming all values less than the detection limit equal to zero.

(g) s = number of samples/analyses greater than the detection limit.

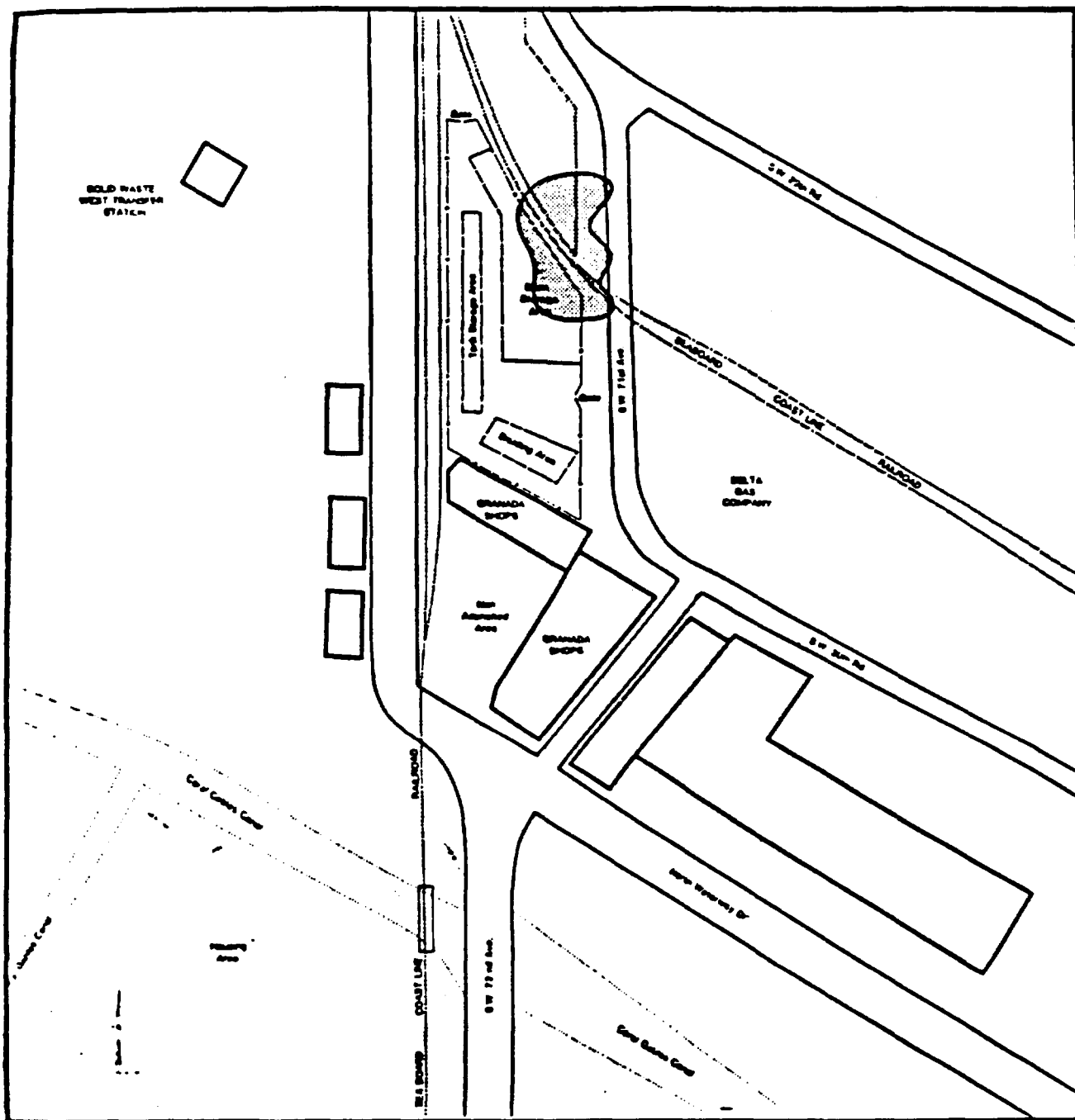
(h) ND = Not detected.

(i) N = 2

(j) N = 7

(k) Estimated value.





**Base from Ecology and Environment (1981)**

SCALE 0 100 200 300 400 FEET.

EXPLANATION

Area of resistivity anomaly, approximately located.

FIGURE 4      APPROXIMATE LOCATION OF AREAL RESISTIVITY ANOMALY

100 to 110 feet below land surface. The upper layer of the Biscayne aquifer is composed of sandy limestone. It is highly permeable with numerous small solution openings, many of which are sand filled.

The Miami Oolite directly underlies the sandy limestone layer of the Biscayne Aquifer and is composed of limestone, ranging in thickness from 10 to 15 feet. A layer of fine sand of varying thickness underlies the Miami Oolite. Below the sand is the Fort Thompson Formation of Pleistocene age. Figure 5 shows a generalized geologic section of the aquifer for an area near the Miami International Airport which is approximately three miles north of the site. It is composed of hard, condensed limestone and thick layers of solution-riddled limestone. The bottom of the Fort Thompson Formation represents the base of the Biscayne Aquifer. Underlying the Biscayne Aquifer are the Tamiami Formation and the Hawthorne Formation, composed of sand, silt, marl and clay. These formations reach a depth of about 700 feet and separate the Biscayne Aquifer from the Floridan Aquifer.

#### Soil Assessment:

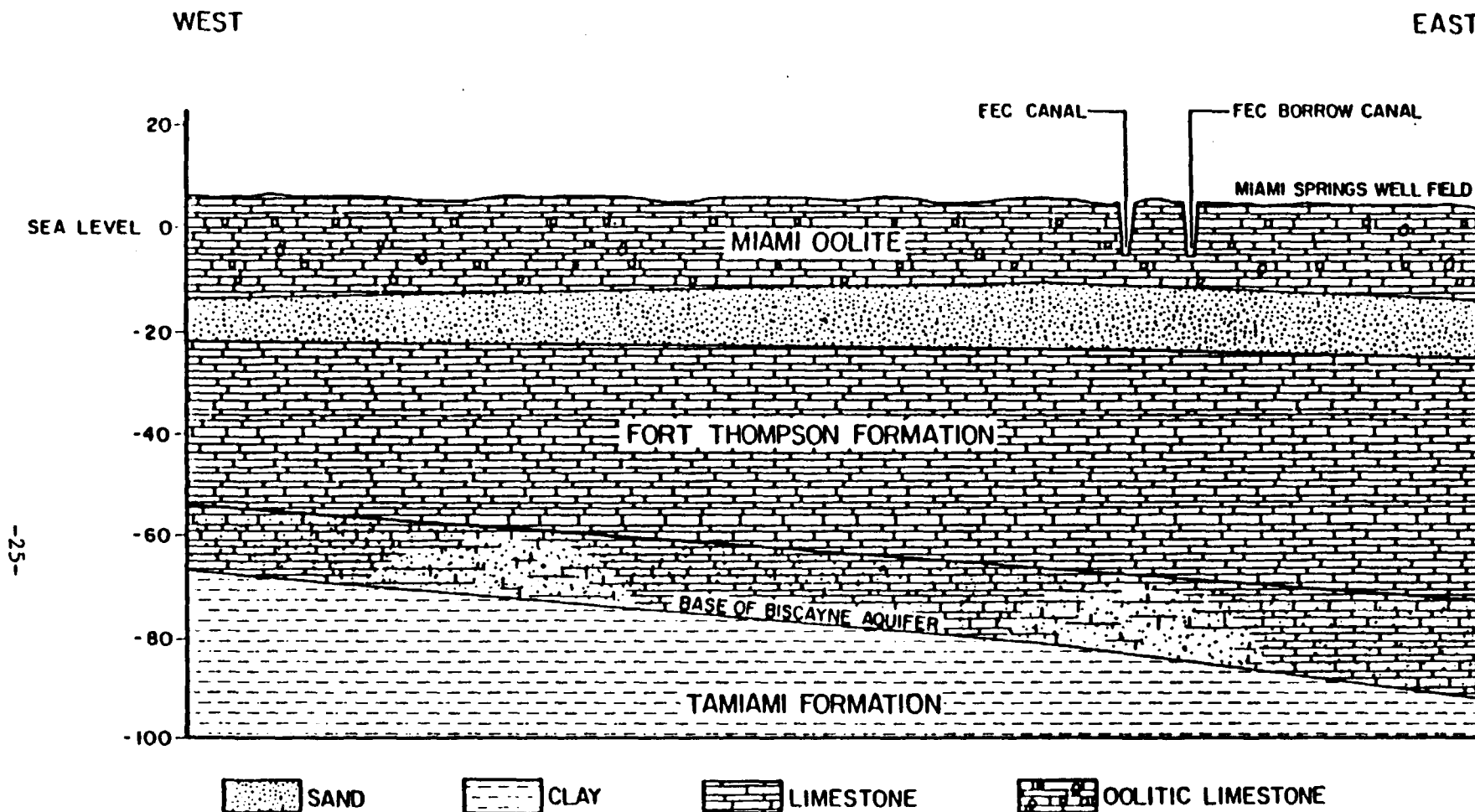
Soils at the site are contaminated by organic compounds and lead. The presence of these contaminants poses a potential risk for further contamination of ground water beneath the site, by continued leaching of the contaminants and overland runoff.

#### Hydrological Characteristics:

The non-artesian Biscayne Aquifer is the only groundwater source of drinking water in southeastern Florida and has been designated a sole-source aquifer. At the GCO site, the water table of the Biscayne is normally seven to eight feet below the land surface. The aquifer is wedge shaped. In coastal Dade and Broward Counties it is over 200 feet thick, but decreases progressively westward to only a few feet in western Dade and Broward Counties. The GCO site is located in coastal Dade County. The aquifer is recharged primarily by rainfall. Discharge occurs through evapotranspiration, canal drainage, pumping and coastal seepage.

Regional flow of the Biscayne Aquifer is east toward the Atlantic Ocean with a very low hydraulic gradient. Lateral flow velocity averages two feet per day, which indicates a high permeability coefficient. However, local ground water flow is intimately associated with drainage of the Coral Gables and Tamiami Canals. In effect, the canals dissect the aquifer, and water movement is unrestricted between the two systems. Evidence of this hydraulic connection between the two systems is documented by Klein, who has shown that a sudden rise in canal water levels instantaneously raised groundwater levels in nearby wells.

Localized flow of groundwater is dependent upon the canal water levels in the Coral Gables Canal (south of the GCO site) and the Tamiami Canal (north of the site) as opposed to the groundwater level. When the water level is higher in the local ground water than in the canals, flow is toward the canals. This causes a localized north-south groundwater flow in the vicinity



SOURCE: CH2M HILL, 1982

FIGURE 5  
GENERALIZED GEOLOGIC SECTION NEAR MIAMI INTERNATIONAL AIRPORT  
GOLD COAST OIL SITE, MIAMI, FL

HORIZONTAL SCALE: 1" = 2/3 mile

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of the GCO site.

Vertically impermeable layers restrict the saline Floridan aquifer from infiltrating the Biscayne. However, lateral intrusions of saltwater do occur and may be accelerated by overdrainage of the canals and under drought conditions.

**Groundwater Assessment:**

The presence of organics in the soil and a water table located close to the surface provide an ideal pathway for leaching of contaminants into the groundwater. Leaching of organics from surface and subsurface soils has occurred as evidenced by the presence of these contaminants in the groundwater samples. Also, the earth resistivity survey conducted in 1981 indicated a plume extending to a depth greater than 30 feet at the northeast corner of the property. The potential exists for this plume to migrate towards the Coral Gables Canal or downward further into the Biscayne Aquifer, as dictated by the aquifer configuration.

**Topography:**

The GCO site is located in the (distal) Coastal Lowlands physiographic province, which is characterized by low elevation. The site covers approximately two acres of flat, sandy land. The site is located in the 100-year flood plain, however the Coral Gables Canal is located 850 feet south of the site, and is flow-regulated, so flooding in the area of the site is not likely.

There is no surface water traversing the site, and there is no distinguishable drainage pathway from the site, and water may pond after a rainstorm. The site is located between two drainage canals: the Coral Gables Canal, located about 850 feet south of the site, and the Tamiami Canal, located 1.25 miles north of the site. The Coral Gables Canal drains to Biscayne Bay and then into the Atlantic Ocean. Figure 6 illustrates the location of the Coral Gables Canal in relation to the GCO site. The nearest storm drain is about 100 yards south of the site in the road. This "french drain" discharges into the ground and not the canal.

**Surface Water Assessment:**

The GCO site has no surface water features to transport the contaminants off-site. Since the site is flat, the transport of contaminated soils to surface water via erosion and scouring of contaminated soils from surface water runoff is not probable. There is the potential for subsurface migration of contaminated groundwater to discharge to the Coral Gables Canal. The subsurface migration is controlled by the water table configuration in the area.

The GCO site is located in the 100-year flood plain of the Coral Gables Canal, which could result in surface water contamination in the event of a flood. However, flooding is not likely to occur, as the canal is flow regulated.

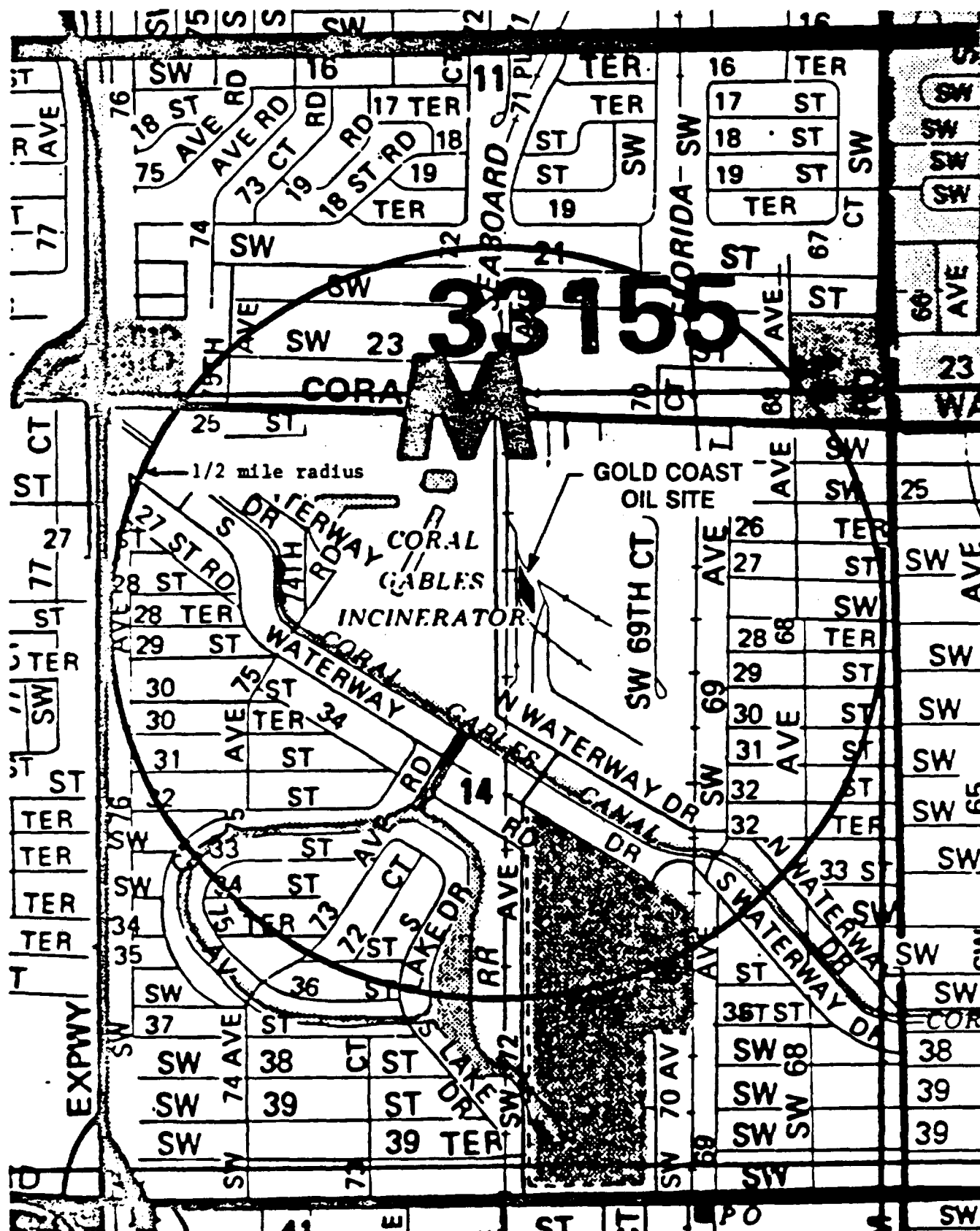


FIGURE 6 GOLD COAST OIL LOCATION MAP

**Climate:**

The climate of Miami is essentially subtropical marine, featured by a long warm summer with abundant rainfall, followed by a mild, dry winter. The marine influence is evidenced by the narrow daily range of temperatures and the rapid warming of cold air masses which pass to the east of the state. The area is subject to winds from the east and southeast. The average annual precipitation is 59 inches per year. The average annual temperature is 75.5° F.

**Atmosphere Assessment:**

The greatest potential for contamination of the atmosphere is through volatilization of organic compounds present in the soil. However, the evaporation process is expected to be in equilibrium at this time at a level which is probably below measurement capabilities. Since the area is open, the accumulation of vapors is not likely. A lesser potential for discharges of volatile organic compounds to the air is through volatilization of contaminants present in the groundwater and surface water.

**Conclusion**

In summary, the potential contaminant migration pathways at the GCO site include:

- Leaching of contaminants from surface and subsurface soils to the groundwater;
- Subsurface migration of contaminated groundwater to surface water; and to a lesser extent,
- Overland flow of contaminants to surface water via surface runoff; and
- Volatilization of contaminants from contaminated surface soils and surface water.

**Contaminants of Concern**

Based on the results of the available monitoring data, seven contaminants were selected as contaminants of concern for this site. These contaminants are intended to be representative, in terms of physicochemical and toxicological properties, of the majority of contaminants present at the GCO site and were selected in accordance with the guidance provided in the Endangerment Assessment Handbook. The contaminants of concern for the GCO site are: methylene chloride, 1,1-dichloroethane, trans-1,2-dichloroethylene, trichloroethylene, tetrachloroethylene, toluene and lead. The organics were selected because high concentrations were detected in groundwater samples in both sampling episodes.

The extractable organics detected during the 1986 sampling are not considered contaminants of concern at this time because they were detected at very low concentrations in scattered wells, with no apparent pattern. In addition, the contamination levels were estimated or based on presumptive analytical techniques that may indicate the presence of the contaminant (see each summary table for the estimated concentrations).

## IV. ENFORCEMENT ANALYSIS

Enforcement History

During 1981, the State of Florida, Dade County, and EPA sought to remedy conditions at the Gold Coast Site through various enforcement actions against the facility and its operator. When it became apparent that the company was financially and technically incapable of taking effective action, EPA initiated an investigation to determine whether CERCLA response would be appropriate. The EPA Surveillance and Analysis Division sampled soil and groundwater at the site, and the Region IV FIT team conducted a resistivity study. Data from these studies indicated that heavy metal and organic chemical contamination was present in the soil and groundwater. On February 2, 1982, EPA approved CERCLA funding for a planned removal action.

CSX Transportation, the site owner, was contacted and agreed to undertake the cleanup in lieu of federal action. CSX Transportation conducted a limited bidding and selected Chemical Waste Management, Inc. to be its cleanup contractor. Both EPA and the State of Florida reviewed the Chemical Waste Management cleanup proposal and an EPA On-Scene Coordinator was present during most of the actual site work. The CSX action was voluntary and was not directed by an EPA administrative order or civil action consent agreement. During the sixteen (16) day cleanup, thirty-nine (39) loads of solids, one (1) load of overpacked flammable solids, and five (5) tanker loads of liquids were removed from the site to Chemical Waste Management's disposal facility in Emelle, Alabama.

Settlement Potential

Because there are several financially viable potentially responsible parties (PRPs) who have participated in various activities related to the site, it is likely that EPA will be able to achieve a negotiated settlement in this case. In addition to the CSX removal action, fifty-seven (57) generators formed a steering committee in 1983, and agreed to perform a Remedial Investigation to address the remaining contamination at the site. The RI workplan was initially reviewed by EPA and the state. Although there appears to have been a break down in communication between the parties concerning final workplan approval, the PRPs contracted with BCM, Inc. to carry out a study at the site. EPA then followed with an Agency-funded Feasibility Study. In November 1985, the generators offered to perform the remedial action indicated as most appropriate in the RI and FS reports and submitted an alternatives selection report, prepared by BCM. Since that time, the generators have maintained contact with EPA and have requested an opportunity to consider undertaking the remedial alternative selected by the Agency. Information submitted by the steering committee indicated that the PRPs have spent approximately \$75,000 to date.

Because the remaining work at this site is remedial, settlement must be achieved through a 106 Consent Decree filed in district court. The Attorney

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General must approve the agreement before it is filed and after filing must provide the public with an opportunity to comment on the proposed agreement before its entry by the court as a final judgement. There are several factors which may expedite the settlement process in this case. First, the PRPs have expressed a desire to resolve this matter as quickly as possible. Second, EPA and the PRPs have exchanged information and comments during the development of the ROD and are in a position to define areas of disagreement. Moreover, the PRPs have been working with a technical consultant throughout this process and should be able to present a settlement proposal within a short time period. For these reasons, it is reasonable to anticipate that EPA will be able to determine whether settlement of this case is possible within sixty days. If a settlement agreement has not been reached within that period, EPA may proceed with a fund financed cleanup or may proceed with a 106 referral to compel the PRPs' to perform the final remedial action.



**V. ALTERNATIVE EVALUATION**

Environmental and Public Health Objectives

**Environmental Objectives:**

The Dade County Department of Environmental Management (DERM) reports that the Coral Gables Canal supports a complex aquatic community, including species such as bass, bluegill, catfish and gar. Other animals present include snakes, turtles, frogs and ducks. It has been determined that neither releases from the GCO site nor the site itself has affected any lands, minerals, water, endangered or threatened plant or animals species, anadromous fish, or Indian resources managed by the the Department of Interior. Accordingly, the Department of Interior has determined that no cause exists to pursue a claim for damages to natural resources, under the trust of the Secretary of the Interior, that may have been affected by the hazardous wastes at the Gold Coast Site in Miami.

In summary, the need to address the environmental concerns is currently based on the need to eliminate the risk of possible exposure from the contaminants identified at the GCO site.

**Public Health Objectives:**

Land use in the vicinity of the Gold Coast Oil site is industrial, commercial and residential. The area has been designated Low Density Residential which allows a maximum of six dwelling units per gross acre. A population of approximately 89,000 reside within a 3-mile radius of the site property. It is estimated that this population will increase to 94,000 by 1990 and remain unchanged through the year 2005.

Public drinking water is obtained from the Alexander Orr Well Field, located approximately three miles southwest of the site. An additional water supply well field, the Hialeah-Miami Springs Well Field, is located approximately 5.5 miles north of the site. Based on the annual water table altitude maps published by the USGS, the site is not within the cone of depression of these well fields and, therefore, is not expected to impact these public drinking water supplies.

Public drinking water is unavailable for a few of the residents within the three-mile radius of the site. These residents use shallow, private wells for potable water. Groundwater usage within the three-mile radius includes irrigation and industrial uses, as well as serving as a drinking water source. The nearest private well is within 100 feet (east) of the site at the Delta Gas Company. Based on a survey of 987 residents and 78 businesses and nonbusinesses (schools, etc.), 84 water wells were identified within a one-half mile radius of the site. Of these, there were four identified residences which currently use well water for drinking/cooking purposes. Two residences are located 0.4 miles southwest of the site and across the Coral Gables Canal. The other two residences are located 0.44 miles northeast of the site.

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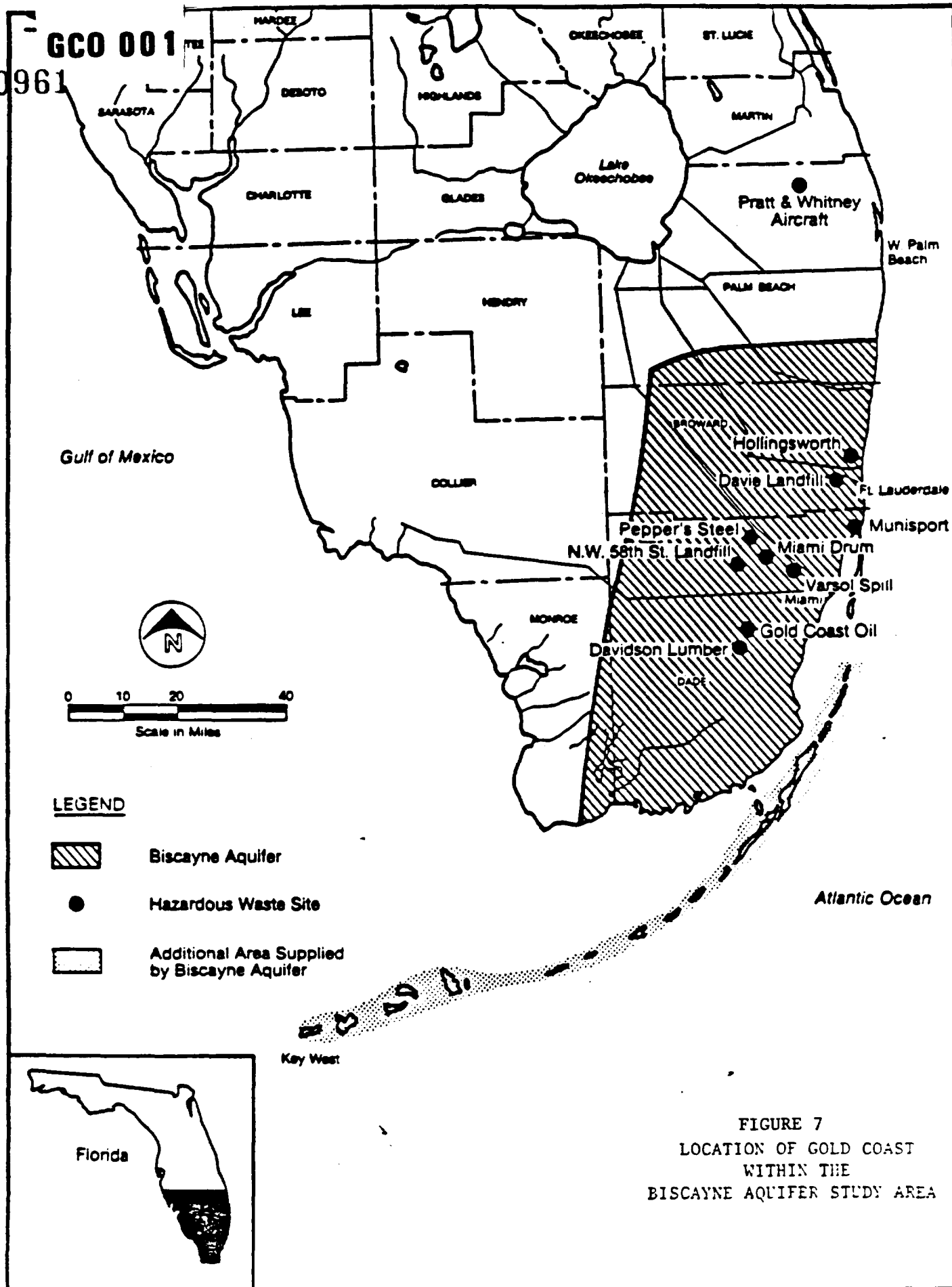
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In conclusion, there is a need to address the public health concerns by (1) eliminating the risk of exposure from contaminated soils and then by (2) remediating the contaminated drinking water source before the contamination plume can migrate further offsite or contaminates a greater portion of the Biscayne Aquifer.

Clean up objectives for the GCO site are based on the above stated environmental and public health concerns and are consistent with the National Oil and Hazardous Substance Contingency Plan (NCP), EPA guidance, state and local regulations and are listed in Section VIII.

The main environmental and public health concern at the site is further migration of the locally polluted groundwater into the Biscayne Aquifer and possibly to nearby private wells. The Biscayne Aquifer has been the subject of numerous studies by DERM, the Florida Department of the Environmental Regulation (FDER), the Florida Health and Rehabilitative Services, the U.S. Geological Survey, the Agency for Toxic Substances and Disease Registry and the U.S. Environmental Protection Agency. The regulatory agencies have carefully evaluated and agreed on the remedies and cleanup levels at other NPL sites such as Varsol-Spill, Miami Drum, and Pepper's Steel, all just north of the GCO site (Figure 7). Not all of the information generated from these studies will be used for the GCO site, but only the ground water cleanup levels. Therefore, selected alternative(s) must demonstrate that control of leachate from the contaminated soils and recovery, treatment and disposal of contaminated ground water will meet the applicable, relevant and appropriate requirements (ARARs) for this sole source aquifer as referenced in the Biscayne Aquifer Study (BAS) and Record of Decision (revised according to Section VIII) and the Safe Drinking Water Act. The clean up for the groundwater contamination plume is based on the revised BAS cleanup levels once the source of the contamination has been remediated.

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Technologies Considered

Several technologies were considered for the GCO site. These technologies considered are presented in Table 9.

Group I technologies are those technologies for source control of the contaminated soils. The purpose of considering any technology from Group I is to address the contaminated soils, which act as a source of contaminated leachate to the groundwater and a source of unnecessary risk by the breathing or the ingestion of contaminated dust. Group I technologies are divided into those that may be conducted on-site and those technologies that may be conducted off-site.

Group II technologies will address the ground water contamination. The Group II technologies are not divided into on-site or off-site, but will address the entire area of contamination, both on and off the GCO site.

A combination of the technologies from Group I and Group II will be considered and screened as potential alternatives. These alternatives will be considered for the selected remedial action at the GCO site. The selected remedial alternative must comply with all applicable or relevant and appropriate environmental laws.

**TABLE 9**

**REMEDIAL TECHNOLOGIES CONSIDERED**

**GROUP I SOURCE CONTROL TECHNOLOGIES FOR SOILS**

SC-1. No Action

SC-2. On-site technologies:

- a. Surface Capping
- b. Land disposal
- c. Air Stripping (aeration)
- d. Steam Stripping
- e. Incineration
- f. Stabilization/Solidification

SC-3. Off-site technologies:

- a. Incineration, carried via railroad
- b. Disposal at a RCRA-approved facility

**GROUP II GROUND WATER TECHNOLOGIES**

GW-1. No Action

GW-2. Slurry Wall

GW-3. In-situ Physical/Chemical Treatment Beds

GW-4. Groundwater Recovery, Treatment, and Disposal

Disposal:

- a. Discharge to Coral Gables Canal
- b. Recharge to Aquifer
- c. Discharge to POTW

Preliminary Technology Screening

The purpose of the preliminary screening is to identify those technologies that apply to the site.

For the GCO site, the preliminary screening will exclude those technologies not applicable based on the characteristics of the site or the site's contamination. The preliminary technology screening process will produce remedial technologies that will be considered further as alternatives.

SC-2.a. Surface capping alone offers no permanent treatment to the identified contaminants. Capping fails to reduce the toxicity by treatment or destruction and does not reduce the volume of contamination. Some source control is achieved by the reduction of contaminant mobility to the ground water by prohibiting infiltration. Surface capping alone does not achieve any treatment or reduction to the contamination.

SC-2.b. On-site land disposal alone does not present a permanent treatment of the identified contaminants. Land disposal is more effective in reducing mobility of the contaminants than surface capping described above. A land disposal facility constructed to current RCRA guidelines would be undesirable at this site, in light of the leachate collection system and the construction of the bottom and side-wall liner required because of the high water table. Realistically, land disposal facilities are subject to failure at some future date. Therefore, land disposal facilities require long-term monitoring and maintenance. Administrative and institutional variances would be required for a land disposal facility in this area of Miami.

GW-2. A slurry wall alone would not effectively address the contaminated ground water. The walls do not reduce the toxicity or volume of the contaminated ground water, only contaminant mobility. Construction of slurry walls are technically difficult because a well-defined or continuous confining stratum in the area of the site does not exist. The aquifer is cavernous in areas, contributing to construction difficulties. Escape of the contaminated ground water from the slurry wall area is likely during wet/dry cycles where the ground water level changes.

Since the local canals, the Coral and Tamiami, are controlled water ways, contaminant escape may occur more frequently than during wet/dry cycles alone.

GW-3. In-situ physical/chemical treatment beds could apply some degree of treatment to the contaminated ground water. However, based on the depth and areal extent of ground water contamination, treatment beds are not technically feasible. Contaminants have been identified at depths in excess of 40 feet while the base of the aquifer is estimated to be 100 feet. Under these conditions, treatment beds would be impractical to construct or monitor.

Table 10 presents a list of those technologies that have failed the initial screening and are eliminated from further consideration.

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TABLE 10  
 TECHNOLOGIES ELIMINATED DURING THE SCREENING PROCESS

|  | EFFECTIVENESS  | IMPLEMENTABILITY      |                            |
|--|----------------|-----------------------|----------------------------|
|  | Protectiveness | Technical Feasibility | Administrative Feasibility |
| <u>SOURCE CONTROL TECHNOLOGY</u>                                     |                |                       |                            |
| SC-2. On-Site Technologies<br>a. Surface Capping<br>b. Land Disposal | F<br>F         |                       | F                          |
| <u>GROUND WATER TECHNOLOGIES</u>                                     |                |                       |                            |
| GW-2. Slurry Walls<br>GW-3. In-situ P/C Treat Beds                   | F              | F<br>F                |                            |

F = Failure to provide

Alternatives Considered

Those technologies remaining following the initial screening may be combined and considered as potential alternatives if they meet requirements of SARA, based on the characteristics of the site and the contamination identified. The alternative comparison and analysis process reflects the remedial actions EPA may conduct. The seven alternatives have been formulated and are presented in Table 11.

The no-action alternative for source control of the soils and for ground water treatment is included as an alternative to fulfill the requirements of 40 CFR 300.68. The no-action option, at a minimum, will address those non-hazardous items identified Table 11, as well as provide continuous environmental monitoring. These items are common to all the alternatives considered.



TABLE 11  
REMEDIAL ACTION ALTERNATIVES CONSIDERED  
FOR DETAILED ANALYSIS\*

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Alternative 1 : No Action\*\*

Alternative 2 : Air Stripping of Soils/ Ground Water Recovery, Treatment,  
and Disposal

Alternative 3 : Steam Stripping of Soils/ Ground Water Recovery, Treatment,  
and Disposal

Alternative 4 : Onsite Incineration of Soils/Ground Water Recovery, Treatment,  
and Disposal

Alternative 5 : Stabilization/Solidification of Soils/Ground Water Recovery,  
Treatment, and Disposal

Alternative 6 : Offsite Incineration of Soils/Ground Water Recovery, Treatment,  
and Disposal

Alternative 7 : Offsite Disposal of Soils/Ground Water Recovery, Treatment,  
and Disposal

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\* Components common to all remedial action alternatives which will not be subject to the detailed analysis include:

- ° Repair of the chain link fence, approximately 50 linear feet;
- ° Removal and disposal of four to six storage tanks;
- ° Removal and disposal of concrete block office and supply shed;
- ° Removal and disposal of two abandoned automobiles and an aircraft engine;
- ° Removal and disposal of two concrete slabs;
- ° Removal and disposal of concrete storage saddles; and
- ° Testing and decommissioning of the onsite supply well.

\*\* The No-Action alternative also includes continuous environmental monitoring.

Detailed Analysis of Alternatives

Analysis Criteria. The Superfund Amendments and Reauthorization Act (SARA) of 1986 specifically requires a detailed analysis of proposed remedial actions on the basis of effectiveness, implementability, and cost. The following is an outline of these comparisons, except for cost which is presented in Section VIII.

Effectiveness, as defined in SARA, refers to how a particular technology may provide:

- protectiveness: in the short-term, refers to the risk to workers or to the community during construction; in the long-term refers to what risk may occur to workers conducting normal operations and maintenance or risk to the community from residual hazardous substances.
- reliability: in the short-term, refers to the probability of failure of the remedy and the resulting risk to workers and the community; in the long-term, refers to the prevention of future exposure to residuals by the community and the potential need for replacement. This may also imply an industry-wide acceptance of the technology for treating the waste.
- reduction in toxicity, mobility or volume: in the short-term, refers to the degree of destruction or the amount of treatment and the amount of waste destroyed or treated; in the long-term, refers to the degree of destruction or treatment, the amount of waste destroyed or treated and reversibility of treatment that may result in the potential for increased mobility.
- applicable or relevant and appropriate requirements (ARARs): in the short- and long-term refers to compliance with ARARs for health-based or technology-based criteria or cleanup levels, also if waivers are being considered from applicable ARARs.

Implementability as defined in SARA refers to how a particular technology may provide:

- technical feasibility: in the short-term, refers to the current technical limitation; in the long-term, refers to the ease of undertaking additional remedial action, if necessary, or the ability to monitor and review effectiveness of temporary remedies or the likelihood of development of new applicable technologies and the maintenance of O & M equipment.
- administrative feasibility: in the short-term, refers to community relations or coordination with other agencies or obtaining approvals needed for site access; in the long-term, refers to community relations and/or coordination with other agencies.
- availability: in the short-term refers to the capacity and location of available treatment, storage and disposal (TSD) services and the availability of necessary equipment and specialists; in the long-term, refers to any anticipated short-fall in TSD capacity.

Alternative Analysis. The remedial action alternatives have been analyzed according to the criteria mentioned above. Since technology GW-4. Ground Water Recovery, Treatment, and Disposal is common to all seven remedial action alternatives, except no action, the detailed analysis of technology GW-4 is discussed separately below, followed by the discussion of each remedial action alternative.

**GW-4. Ground Water Recovery, Treatment, and Disposal:** Recovery of the contaminated ground water at the GCO site can be accomplished through a system of recovery wells. The recovery system will require additional field investigation to design it. Technologies and techniques for the installation of recovery wells are well established in the well drilling industry.

The treatment system designed to treat the recovered ground water will be based on current, proven techniques. Bench and/or pilot studies will be performed during the design to determine the most appropriate and effective treatment method. For example, air stripping of the contaminated ground water to remove the volatile organics followed by carbon adsorption for the removal of non-volatile organics may be an acceptable treatment system. However, air stripping alone may be all that is needed.

Conceptually, the treatment system could consist of two treatment trains for process efficiency and safety. The pretreatment unit would consist of flow equalization basins, chemical precipitation-coagulation treatment, and a sedimentation basin. The next unit would contain the air stripping unit consisting of a contact system that provides for mass transfer of volatile organic contaminants from a dilute aqueous waste stream into an air stream. The final unit would be a tertiary treatment unit consisting of a filtration basin, carbon adsorption units, effluent storage tanks, sludge thickening and dewatering units, and sludge and spent carbon storage units. Disposal of the sludge and spent carbon would be addressed in the remedial design but would meet the required environmental laws.

For disposal of the treated ground water, several options exist. Each of these disposal options employs standard techniques available in the industry and have been proven reliable. These are:

- ° Discharge to the Coral Gables Canal
- ° Recharge to the Biscayne Aquifer
- ° Discharge to the local publicly-owned treatment works (POTW)

The ultimate disposal following treatment is dependent on certain aquifer characteristics that will be determined during the design of the remedial action. The degree of treatment of the recovered ground water will be dictated by the disposal option and will be in accordance with all applicable or relevant and appropriate environmental laws.

- a.) Disposal to the Coral Gables Canal carries the potential of contamination to the canal should the onsite treatment system fail. If the treatment

system were operated in the batch mode, the final settling basin could be checked to determine whether each discharge to the canal had achieved the desired clean up level. Prior to discharge, the treated ground water must meet the technical requirements of the National Pollutant Discharge Elimination System (NPDES) limits of the Clean Water Act for discharge to surface water.

- b.) Disposal to the ground water by reinjection is a viable option, however it is dependent on the local hydrogeologic conditions. The local ground water table is known to be high and reinjection may result in local flooding of the surface areas. Any flooding of this type could result in structural damage to surrounding streets or building foundations. This option may prove attractive if it is determined from aquifer characteristics that the possibility of drawing contamination from neighboring areas into the recovery zone exists. If this is the case, recharge to the aquifer at select locations can minimize this problem.
- c.) Disposal to the publicly-owned treatment works (POTW) appears to have the least environmental impact. Pretreatment standards have been established under the Clean Water Act and by the POTW as maximum contaminant acceptance levels. These standards will be met prior to discharge to the POTW. The problems mentioned for reinjection would not apply for this disposal option.

Ground water recovery and treatment can meet the requirements of SARA for both implementability and effectiveness. Similarly, the disposal option selected can also meet the SARA requirements for effectiveness and implementability.

Alternative 1 - No Action: This alternative implies that there is no threat posed by the contaminants present at the GCO site and that no remedial action is needed. Contaminated soils and sludges would remain in place and continue to be a source of environmental and public exposure. More importantly, the contamination of the Biscayne Aquifer would not be addressed. The Biscayne Aquifer, a sole source aquifer, would remain contaminated, and the contaminated plume would migrate further offsite and, possibly, to nearby private drinking water wells. This alternative has been considered under the mandates of the NCP; however, based on the site-specific information and the above discussion, this alternative would not meet the public health and environmental objectives.

Alternative 2 - Air Stripping of Soils/GW Recovery, Treatment, and Disposal: Onsite air stripping involves contacting clean air with the contaminated soils to transfer the volatile organics from the soil to the air stream. A number of different methods have been commercially developed for this process including the enclosed mechanical aeration system and mechanical rototilling.

An enclosed mechanical aeration system consists of mixing the contaminated soils in a rotary drum system. The volatile organics are released from the soil matrix by the churning action (air/soil contact). The key is an induced

air-flow system within the cover structure that carries the volatile organics from the soil particles.

The mobile air stripping process produces air emissions of volatile organic compounds. These emissions can be treated by activated carbon cannisters and/or water scrubbers. Commercial use of mobile air stripping units for soil have a wide range of applications and therefore have been proven reliable.

On-site mobile air stripping or aeration alone could be designed to meet the requirements of SARA for implementability, but not for effectiveness. The lead contamination can not be effectively treated by aeration.

Alternative 3 - Steam Stripping of Soils/GW Recovery, Treatment, and Disposal: On-site mobile steam stripping is a unit process that uses steam to extract organic contaminants from a slurry. Direct injection of steam or a multiple pass heat exchanger are two of the common methods of steam stripping. This process is less effective when the solids content is extremely high, since the contact between the steam and solid material is difficult to achieve. The process is also energy intensive and steam production may account for a major portion of the operating cost. On-site mobile steam stripping produces volatile organic compound emissions, which can be treated by capturing them using vapor phase carbon adsorption. However, the wastewater stream from the stripping process may require further treatment to remove metals or non-volatile organics stripped during treatment. Commercial mobile steam stripping units for soil have been developed.

On-site mobile steam stripping could be designed to meet the requirements of SARA for implementability, but not for effectiveness. The effective treatment of lead is not accomplished by steam stripping alone.

Alternative 4 - Onsite Incineration of Soils/GW Recovery, Treatment, and Disposal: On-site mobile incineration by a rotary kiln incinerator or thermal treatment system utilizes a rotary kiln as a primary furnace configuration for combustion of soils. The operation involves the introduction of wastes and auxiliary fuel into the high end of a cylindrical, refractory-lined kiln. As the waste and fuel pass through the kiln, wastes are substantially oxidized to gases and ash. The application of rotary kiln technology in mobile systems is based on extensive operating experience at fixed facilities. As of this time, it is the only thermal technology with operating experience as a full-scale mobile system. A large number of firms, as well as the EPA-ORD, are currently applying rotary kiln technology to mobile systems. Incinerator residues may require further treatment depending upon the level of contamination remaining. Waste with very high heavy metals concentrations can result in elevated emissions of those same metals, which are difficult to collect with air pollution control equipment.

On-site mobile rotary kiln incineration could be designed to meet the requirements of SARA for implementability, but again, not for effectiveness. The lead contamination may prevent achievement of all ARARs by incineration alone.

**Alternative 5 - Stabil/Solid/GW Recovery, Treatment, and Disposal:**

On-site mobile stabilization/solidification would involve the stabilization/solidification (s/s) of contaminated soils with onsite placement and construction of a cap. The process of s/s can address inorganics or organics of heavier molecular weight. The s/s process always requires pilot studies. The resulting solidified waste must pass a variety of specifications for leachability, free liquid content, physical stability, reactivity of waste, ignitability, ability to support microbial growth, strength, permeability, durability and others that may be required because of the characteristic of site's hydrogeology and meteorological conditions. Most solidified wastes are not designed for constant exposure to weathering. A cap that is thick enough to insure that the solidified material maintains uniform moisture and is not subjected to freezing may be necessary to insure that the remedy does not deteriorate. The cap also should minimize the percolation of water into the waste. A periodic inspection and maintenance of the waste cap is generally part of the remedy.

This alternative can be designed to effectively achieve ARARs for lead as well as other heavy molecular weight organics associated with the site.

**Alternative 6 - Offsite Incineration of Soils/GW Recovery, Treatment and Disposal:** This alternative involves transporting contaminated soils offsite by rail for incineration. A mobile infrared incinerator is located in Tampa, Florida. The incinerator is being used to treat the sludge at the Peak Oil site.

This alternative is difficult administratively. EPA is not in the hazardous waste disposal business, and the treatment of the GCO waste material at the Peak Oil site will require special negotiations and/or permits to treat waste from one NPL site at another NPL site. Although the infrared system is expected to be of greater capacity and use less excess air than the mobile unit described in Alternative 4 above, similar problems concerning achieving the ARARs for lead are expected to remain for the infrared system.

**Alternative 7 - Offsite Disposal of Soils/GW Recovery, Treatment, and Disposal:** Off-site disposal alone at a RCRA approved facility does not present a permanent treatment of the contamination, but simply moves the contaminated soil from one location to another. Off-site remedial action, such as the transfer of contaminated soil, is administratively feasible only if a number of RCRA and state requirements are met. One requirement is that the facility receiving the contaminants is in compliance with RCRA. A pretreatment requirement is applied to hazardous waste containing more than 1.0% total solvents of RCRA interest. The hazardous waste must be treated by what is referred to as the best demonstrated available technology to a predetermined level before disposal of the waste at the approved RCRA facility. Other administrative requirements include permits to transport the waste from the site to the approved facility.

Table 12 summarizes the detailed analysis described above for implementability and effectiveness. Notice that the no-action alternative is still included.

TABLE 12

## ALTERNATIVES DETAILED ANALYSIS

| ALTERNATIVES**                                | EFFECTIVENESS† |     |                            |    |             |    |       |    | IMPLEMENTABILITY†     |    |                            |    |              |    |
|---|----------------|-----|----------------------------|----|-------------|----|-------|----|-----------------------|----|----------------------------|----|--------------|----|
|   | Protectiveness |     | Reduction to Mob/ Tox/ Vol |    | Reliability |    | ARARs |    | Technical Feasibility |    | Administrative Feasibility |    | Availability |    |
|   | ST*            | LT* | ST                         | LT | ST          | LT | ST    | LT | ST                    | LT | ST                         | LT | ST           | LT |
| Alt 1 - No Action                             | 1              | 1   | 1                          | 1  | 1           | 1  | 1     | 1  | 1                     | 1  | 1                          | 1  |              |    |
| Alt 2 - Air Stripping of Soils/GW Remediation | 2              | 2   | 2                          | 2  | 3           | 3  | 2     | 1  | 3                     | 3  | 3                          | 3  | 3            | 3  |
| Alt 3 - Steam Stripping/GW Remediation        | 2              | 2   | 2                          | 2  | 3           | 3  | 2     | 1  | 3                     | 3  | 3                          | 3  | 3            | 3  |
| Alt 4 - Onsite Incin/GW Remediation           | 2              | 2   | 2                          | 2  | 3           | 3  | 2     | 1  | 3                     | 3  | 3                          | 3  | 2            | 2  |
| Alt 5 - Stabil/Solid/GW Remediation           | 2              | 3   | 3                          | 3  | 3           | 3  | 3     | 3  | 3                     | 3  | 3                          | 3  | 3            | 3  |
| Alt 6 - Offsite Incin/GW Remediation          | 2              | 2   | 2                          | 2  | 3           | 3  | 2     | 1  | 3                     | 3  | 1                          | 1  | 1            | 1  |
| Alt 7 - Offsite Disposal GW Remediation       | 2              | 3   | 3                          | 3  | 3           | 3  | 2     | 3  | 3                     | 3  | 3                          | 3  | 2            | 3  |
|   |                |     |                            |    |             |    |       |    |                       |    |                            |    |              |    |
| **GW-4. GW Recovery, Treatment, & Disposal    | 3              | 3   | 3                          | 3  | 3           | 3  | 3     | 3  | 3                     | 3  | 3                          | 3  | 3            | 3  |
| a. Coral Gables Canal                         | 2              | 2   | 3                          | 3  | 3           | 3  | 3     | 3  | 3                     | 3  | 2                          | 2  | 3            | 3  |
| b. Recharge to aquifer                        | 2              | 2   | 3                          | 3  | 3           | 3  | 3     | 3  | 3                     | 3  | 2                          | 2  | 3            | 3  |
| c. POTW                                       | 2              | 3   | 3                          | 3  | 3           | 3  | 3     | 3  | 3                     | 3  | 3                          | 3  | 3            | 3  |

† Degree of Achievement  
 1 = unfavorable  
 2 = fair  
 3 = favorable

\* ST = Short Term  
 LT = Long Term

\*\* For clarity, the GW Remediation detailed analysis is listed separately to illustrate the analysis for the various disposal options.

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## VI. COMMUNITY RELATIONS

Although citizen interest regarding water quality in the Biscayne Aquifer has been generally high, particularly in the Miami area, community involvement in the Gold Coast site has been very limited. Regardless, EPA has performed numerous community relations activities in an effort to keep State and County officials and interested citizens informed of site activities and pertinent site developments.

To carry out the objectives stated above, a community relations assessment was prepared for EPA by the NUS Corporation as part of the Remedial Action Master Plan for the Gold Coast site (June 1983). This assessment was a preliminary attempt to judge the nature of community involvement with the Gold Coast site, based only on file documents from EPA, the State of Florida, and Dade County. Highlights of this assessment include a community relations history, a summary of issues and concerns, community relations objectives, community relations techniques, and a listing of interested parties.

EPA also periodically published a newsletter called "Remedies: An Update of Hazardous Waste Issues", and disseminated it to the public. This newsletter was intended to provide local citizens' groups, environmental groups, and State and local officials with current information about the Biscayne Aquifer site study, which consists of three Miami-area hazardous waste sites. However, EPA included in the October 1983 and July 1984 issues of "Remedies" an update of the Gold Coast site for the purposes of keeping interested parties abreast of the Gold Coast site developments and progress.

Four information repositories were established in the Spring of 1985 to house all site information and documents. The repositories can be accessed at the following locations: Miami-Dade Public Library, West Dade Regional Library, Dade County Department of Environmental Resource Management (DERM), and Florida Department of Environmental Regulation (FDER). In addition, EPA was contacted by a representative of Environmental Information Systems (Miami Springs environmental group) who volunteered to house an additional information repository. Site documents were mailed to this group for establishment of a repository (June 1985).

In May 1985, a fact sheet concerning the Gold Coast site was prepared and distributed to interested citizens, area residents, local press, public officials and the potentially responsible parties. The fact sheet summarized the site history, current site status, and future plans of the site, as well as announced a Public Meeting to present the results of the Feasibility Study. EPA, State, and County contacts were identified. The fact sheet was mailed two weeks prior to the meeting. Also at this time, public notices and press releases were issued to the appropriate media as announcements for the meeting.



The Public Meeting was held at the West Dade Regional Library in Miami, Florida on June 11, 1985. The purpose of the meeting was to present the RI/FS Reports and the recommended site remedy, and to respond to questions from citizens. Approximately 23 people attended the meeting, including area residents and media representatives; however, the majority of the attendees were representatives of potentially responsible parties. Questions raised during the meeting pertained to the recommended alternative, liability concerns, area ground water characteristics, and the project schedule. Overall, public attendance and participation was minimal.

The Public Meeting marked the beginning of a formal 3-week public comment period (6/12/85 - 7/3/85), during which time the public was encouraged to submit written comments to EPA concerning the FS and the recommended remedy. However, no written comments were received by EPA. The Responsiveness Summary is attached as Appendix B.

Future community relations activities will include revision of the Community Relations Plan to accomodate the remedial design and remedial action phases. The revised Community Relation Plan will utilize all four (4) established repositories.

## VII. CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

In selecting remedial alternatives, primary consideration must be granted under the Superfund Amendments and Reauthorization Act of 1986 to remedies that achieve applicable or relevant and appropriate regulations (ARARs) for protection of public health and the environment. For the GCO site, such Federal laws and guidelines to be considered include:

- National Environmental Protection Act
- Toxic Substances and Control Act
- Department of Transportation Hazardous Material Transport Rules
- Resource Conservation and Recovery Act
- Clean Air Act
- Safe Drinking Water Act
- Clean Water Act

The requirements of the National Environmental Protection Act (NEPA) have been met by conducting the functionally equivalent remedial investigation and feasibility study. Additionally, the results of these studies have been presented to the public at a public meeting, and the public was given the opportunity to comment on the results of the studies and the proposed plan for remedial action.

The Toxic Substances and Control Act (TSCA) requirements do not apply to any of the remedial alternatives under consideration for the GCO site. None of the contaminants found at the GCO site are regulated under TSCA, and therefore, there are no ARARs to be considered under this regulation.

For alternatives which include transportation of contaminated soils and hardened waste sludges, the Department of Transportation (DOT) Hazardous Material Transport Rules require that the proper labeling and safety requirements be followed.

On November 7, 1986, the Resource Conservation and Recovery Act (RCRA) established restrictions on the disposal of contaminated soil in permanent land disposal facilities. This "land ban" requires that total soil contamination content exceeding 1.0% must be pretreated prior to disposal in a RCRA-approved hazardous waste facility. At the GCO site, the total contaminant content of the entire soil/solvent mixture that is of RCRA interest is 0.2%. Therefore, disposal of contaminated soils at an offsite, approved RCRA facility is consistent with this ARAR. Additionally, the RCRA land ban does not officially take effect until November, 1988. It is expected that offsite disposal of contaminated soil would be implemented prior to that time. However, should the soil to be disposed offsite exceed the 1.0% limit or should implementation occur after the November, 1988 deadline, other measures will be taken to ensure that the remedial action is consistent with the RCRA land ban. If stabilization/solidification is the preferred remedial alternative, this procedure must be in compliance with the RCRA guide to disposal of chemically stabilized and solidified waste and the RCRA requirements for closing

waste in place. RCRA requirements for the incineration of waste would apply to the incineration of contaminated soils, both onsite and offsite. However, incineration would not effectively eliminate the lead contamination and, therefore, RCRA requirements would not be met.

During remediation of the GCO site, it will be important to preserve the quality of the ambient air at the site. Therefore, the requirements of the Clean Air Act (CAA) will apply to the excavation of contaminated soils and hardened waste sludges, the aeration and incineration of contaminated soils, and the treatment of contaminated ground water. Continuous air monitors will be installed onsite during the aeration of contaminated soils and treatment of contaminated ground water due to the potential of contaminating the ambient air by these remediation processes. Any contaminants being emitted into the ambient air will be in compliance with the appropriate National Ambient Air Quality Standards. Should a violation occur, the proper measures will be taken to remedy the violation. Since the excavation of contaminated soils often causes fugitive emissions (dust particles) to occur, the appropriate dust control measures will be in place during soil excavation.

The Biscayne Aquifer is a "Sole Source Aquifer" under Section 1424(e) of the Safe Drinking Water Act (SDWA), as well as a Class I ground water under EPA's ground water classification system. As such, it deserves the highest level of protection afforded by EPA programs. Therefore, chemical-specific cleanup goals have been set for the contaminants of concern in the ground water under the GCO site (see Section VIII). The standards are consistent with the Recommended Maximum Contaminant Levels (RMCLs) designated by the SDWA and the Cancer Assessment Group (CAG) estimate of a 10(-6) risk level from a lifetime exposure. These cleanup goals have been determined for cleanup of the Biscayne Aquifer in the Biscayne Aquifer Study and have been revised using updated regulatory and toxicological information, including the Florida Administrative Code (FAC) Chapter 17-3 which specifies water quality standards for ground water and drinking water. Both the State and EPA have determined that the use of these goals as ARARs for ground water treatment will ensure that the Biscayne Aquifer is restored to acceptable levels for drinking water purposes. Additionally, should recharge to the Biscayne Aquifer be the preferred disposal option, the recovered ground water must also be treated to a degree that is consistent with the established cleanup goals for the Biscayne Aquifer. This will ensure that any water returned to the aquifer is of a quality suitable for drinking water purposes.

Several aspects of the Clean Water Act (CWA) are considered ARARs for remediation of the GCO site. Specifically, the National Pollutant Discharge Elimination System (NPDES) would apply to the discharge of treated ground water to the Coral Gables Canal. The FAC Chapter 17-3 also specifies surface water discharge standards that would apply to discharge to the canal. Should this disposal option be implemented, the technical requirements of the NPDES and the FAC for discharge to surface waters

must be met by the ground water treatment process. Additionally, the CWA specifies pretreatment standards for discharge of treated ground water to the POTW. For this action, coordination with the Miami-Dade Water and Sewer Authority must take place to identify any more stringent pretreatment standards they may have.

As there are no regulations governing the treatment of contaminated soils, the EPA and FDER have negotiated soil cleanup goals that will apply to the soil remediation at the GCO site. These cleanup goals can be considered the ARARs for the soil remediation and have been established by examining the level of contamination in the soils and estimating the effect on the ground water system. This has resulted in the establishment of 100 ppm total lead in the soils as the ARAR for soil remediation.

A preliminary natural resources survey was conducted by the Fish and Wildlife Service of the Department of Interior. The result of the survey is that neither releases from the site nor the site itself have affected any lands, minerals, water, endangered or threatened plants, animal species, or Indian resources managed or protected by the Department of Interior. No natural wetland areas are being affected by remediation of the GCO site.

No waiver of compliance from any environmental requirements is planned for the remediation of the soils or ground water at the GCO site.

Table 13 summarizes the alternatives and their compliance with other environmental laws.

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TABLE 13  
SUMMARY OF COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS

| Institutional Criteria  | A L T E R N A T I V E S* |       |       |       |       |       |       |          |    |    |   |
|---|--------------------------|-------|-------|-------|-------|-------|-------|----------|----|----|---|
|   | Alt 1                    | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 6 | Alt 7 | **GW-4.a | .b | .c |   |
| National Environmental Protection Act                               | C                        | C     | C     | C     | C     | C     | C     |          | C  | C  | C |
| Toxic Substances Control Act  | X                        | X     | X     | X     | X     | X     | X     |          | X  | X  | X |
| DOT Hazardous Transport Rules                                       | X                        | X     | X     | X     | X     | C     | C     |          | X  | X  | X |
| Resource Conservation and Recovery Act                              | N                        | X     | X     | N     | C     | N     | C     |          | X  | X  | X |
| Clean Air Act   | X                        | C     | C     | C     | C     | C     | C     |          | X  | X  | X |
| Safe Drinking Water Act   | N                        | C     | C     | C     | C     | C     | C     |          | X  | C  | X |
| Clean Water Act   | N                        | X     | X     | X     | X     | X     | X     |          | C  | X  | C |
| Florida Administrative Code Chapter 17-3<br>Water Quality Standards | N                        | C     | C     | C     | C     | C     | C     |          | C  | C  | X |

C - Compliance

N - Non-compliance

X- Not Relevant or Applicable

\*Alt 1 - No Action

Alt 2 - Air Stripping of Soils/GW Remediation

Alt 3 - Steam Stripping of Soils/GW Remediation

Alt 4 - Onsite Incineration of Soils/GW Remediation

Alt 5 - Stabilization/Solidification/GW Remediation

Alt 6 - Offsite Incineration of Soils/GW Remediation

Alt 7 - Offsite Disposal of Soils/GW Remediation

GW-4. - GW Recovery, Treatment, and Disposal

a. Discharge to Coral Gables Canal

b. Recharge to aquifer

c. Discharge to POTW

\*\*For clarity, the GW Remediation analysis is listed separately to illustrate the analysis for the various disposal options.

## VIII. RECOMMENDED ALTERNATIVE

Contamination of surface and subsurface soils and ground water has resulted from the solvent recovery operations of the Gold Coast Oil Company. The PRPs have conducted a removal action for much of the original contamination. However, environmental sampling data indicates contamination continues to exist. Contamination of surface and subsurface soils acts as a continuous source, leaching contaminants to the Biscayne Aquifer. Protection of this sole source aquifer is of singular importance in the development of applicable remedial alternatives.

Of the thirteen technologies considered for the GCO site, seven technologies for source control of soils and two technologies for addressing the ground water remain. These technologies have been combined to form seven remedial action alternatives. The estimated costs of these alternatives are presented for comparison in Table 14. These costs are estimated as if EPA were to conduct the site remediation.

The remedial action alternative recommended for the GCO site includes excavation of contaminated soils and hardened waste sludges (both inside and outside the fenced area) with offsite disposal at an approved RCRA facility; and stabilization/solidification (s/s) of the remaining contaminated soils. To address the contaminated ground water beneath the site, the recommended alternative also includes recovery of the contaminated ground water by means of a recovery well field, treatment of the recovered ground water, and disposal. In addition, the recommended alternative includes construction of a cap over the stabilized/solidified soil; grading and revegetation of the site; repair of the chain link fence; removal and disposal of the storage tanks, office and supply shed, the abandoned automobiles and aircraft engine, and concrete slabs and storage saddles; and testing and decommissioning of the onsite supply well. (Alternatives 5 and 7). This remedy provides source control and management of migration and employs alternative treatment technologies to address the principle threats of contamination at the GCO site.

A combination of alternatives (Alternatives 5 and 7) have been chosen as the recommended alternative at the GCO site in order to adequately address the diverse components of soil contamination at the site. The contaminated soils fall into two categories: soils containing metals contamination and soils containing obvious quantities of hardened waste sludges and metals contamination.

Therefore, soils remediation will be a staged process. The contaminated soils (inside and outside the fenced area) will be excavated with the hardened waste sludges (containing relatively high levels of lead) being separated and disposed of offsite at a RCRA-approved waste management facility. These sludges have remained onsite since the GCO operations ceased and are not considered amenable to treatment that will effectively reduce the toxicity, mobility, or volume. This action will be consistent with the RCRA land ban requirements because the total contaminant content of the entire soil/solvent mixture is approximately 0.2%. This solvent content is below the 1.0% limit

TABLE 14  
ALTERNATIVES COST ESTIMATES†

| Thousands of Dollars                           |              |               |                      |
|--|--------------|---------------|----------------------|
| Alternatives††                                 | Initial Cost | Annual* O & M | Present Worth (Base) |
| Alt. 1 - No Action**                           | 8.5          | 25.8          | 342.5                |
| Alt. 2 - Air Stripping of Soils/GW Remediation | 2,643.3      | 52.5          | 3,708.9              |
| Alt. 3 - Steam Stripping/GW Remediation        | 2,900.2      | 52.5          | 3,965.8              |
| Alt. 4 - Onsite Incineration/GW Remediation    | 7,380.6      | 52.5          | 8,446.1              |
| Alt. 5 - Stabil/Solid/GW Remediation           | 1,942.6      | 75.5          | 3,224.7              |
| Alt. 6 - Offsite Incineration/GW Remediation   | 3,340.4      | 52.5          | 4,405.9              |
| Alt. 7 - Offsite Disposal/GW Remediation       | 2,931.3      | 52.5          | 3,996.8              |

† Capital costs include unit labor, materials, and equipment costs, as appropriate. Also considered in the calculations of the capital costs are the levels of health and safety protection, health and safety monitoring during the implementation of the alternative, project contingency funds, and administration and engineering costs. Typical major capital cost items are site work and utilities, remedial and support facilities, and site closure.

†† GW Remediation for all alternatives includes ground water recovery, treatment, and disposal. Costs presented are for discharge to the POTW. The other disposal options are -\$100 to +\$200, in thousands, for discharge to the Coral Gables Canal and recharge to the aquifer, respectively.

\* The annual O&M costs presented are the 30-year averages.

\*\* The cost for the No Action alternative includes those non-hazardous items that are common to all alternatives, as well as continuous ground water monitoring.

for disposal without pretreatment. RCRA addresses 25 solvents under its land ban regulations, however only five (5) solvents of RCRA interest have been identified at the GCO site. However, should it be evident that the total contaminant content exceeds the 1.0% limit (or should implementation occur after November, 1988), the sludges will be remediated with the remaining contaminated soils.

The remaining contaminated soils will be treated on-site by s/s (to address any remaining metals contamination and residual volatile organic contamination) and placed onsite. A cap will be constructed over the solidified soil. Excavation and treatment of the contaminated soils will be consistent with the site-specific cleanup levels established for the soils. (A discussion of the soil cleanup levels follows this discussion.) An estimate of 1500 cubic yards of soil has been considered for excavation and treatment or disposal. Actual soil volumes could differ in response to soil sampling and analysis performed during the design and/or cleanup phase.

The only viable ground water technology remaining after the technologies screening is recovery, treatment, and disposal. Further aquifer studies will be required to determine recovery characteristics in the local area, however, at this time it does not appear that pumping will have a significant impact on the aquifer. A very conservative 100,000 gallons per day was estimated for recovery and treatment. The ground water remediation program will be designed to remove contaminants down to the aquifer cleanup goals. (A discussion of the ground water cleanup levels follows this discussion.)

A ground water treatment method that offers permanent treatment will be the selected method for treatment. For example, a treatment method such as air stripping followed by carbon adsorption would permanently and significantly reduce the levels of volatile organics and non-volatile organics in the ground water. However, at this time, the lack of pilot and/or bench scale testing and insufficient data on localized aquifer characteristics does not allow selection of the exact ground water treatment method. During the design of the selected alternative, data will be obtained to enable approval by the Agency of the treatment method.

Several disposal options for the treated ground water have been presented and evaluated. These are: recharge to the aquifer, discharge to the Coral Gables Canal, and discharge to the POTW. All these options are implementable and effective options. However, as previously mentioned, discharge to the POTW does not have the potential for environmental contamination should treatment equipment failure occur and thus has the least environmental impact. This option does depend on successful negotiations with the Miami-Dade Water and Sewer Authority to allow discharge of treated water to their facility. Preliminary indications show that this option is negotiable.

The degree of treatment of the recovered ground water is dependent on the discharge option implemented. For instance, for ground water discharge to the POTW, treatment of the ground water would achieve the CWA and POTW pre-



treatment standards. Discharge to surface waters involves disposal of treated ground water to the Coral Gables Canal. The treatment process would be operated in the batch mode to allow monitoring of the final settling basin. This enables confirmation that the appropriate ARARs have been met prior to discharge to the canal and minimizes the potential for surface water contamination of the canal should the onsite treatment system fail.

The third ground water disposal option is recharge to the aquifer. This is an attractive option if it appears that recovery of the ground water will cause migration of contamination from surrounding areas into the recovery zone. This is dependent on local hydrogeologic conditions to be determined during design. In this case, the treatment of the recovered ground water will achieve the aquifer cleanup goals.

Site-specific cleanup levels have been determined for the soils and ground water at the site. For ground water, the classification of the Biscayne Aquifer as a sole source aquifer and Class I ground water is the primary driving force for determining cleanup levels. EPA, with coordination and approval by FDER, has revised the Biscayne Aquifer Study ground water cleanup levels according to updated and appropriate toxicological information and Federal and State ARARs. As discussed in Section II, this study established ground water cleanup levels for the Biscayne Aquifer acceptable to FDER and EPA. The cleanup levels are set at concentrations that would cause no significant health effects if the water is used as a potable water source for a lifetime exposure. The ground water cleanup levels for selected contaminants are:

| <u>Contaminants</u>        | <u>Cleanup Levels, ug/l</u> |
|----------------------------|-----------------------------|
| 1,1-Dichloroethane         | 5.0                         |
| trans-1,2-Dichloroethylene | 70.0                        |
| Methylene Chloride         | 5.0                         |
| Tetrachloroethylene        | 0.7                         |
| Toluene                    | 340.0                       |
| Trichloroethylene          | 3.0                         |

For source control, soil cleanup levels are defined as concentrations in the soil which will not result in exceeding the cleanup levels in the aquifer. EPA, in consultation with FDER, has evaluated the contamination detected at the site and concluded that the organic levels have significantly reduced from the 1983 to 1986 sampling episodes. Based on this, lead has been identified as the contaminant of concern for source control. The soil cleanup level for lead has been set at 100 ppm.

The alternative outlined above is the preferred alternative because alternative treatment technologies are employed to the maximum extent practicable in treating the principle threats posed by the GCO site. The remedy also employs permanent solutions to significantly reduce the toxicity, mobility, or volume and to provide protectiveness of human health and the environment by eliminating the source of ground water contamination and the risk of public exposure to

contaminated soils and ground water. Although this remedy is not the least expensive alternative considered, it is cost-effective since the combination of offsite disposal of hardened waste sludges, s/s of soils, and recovery, treatment, and disposal of ground water is the least expensive alternative that achieves the ARARs for volatiles and non-volatiles in the soils and ground water. The total cost is estimated at \$3,711,660. The 30-year average O&M costs for this alternative is \$74,850. This estimate is based on the following assumptions:

- 500 cubic yards of hardened waste sludges will be excavated and disposed of offsite at a RCRA-approved facility;
- 1000 cubic yards of metals-contaminated soils will be stabilized/solidified and placed onsite with a cap; and
- the ground water disposal option included in this estimate is discharge to the POTW.

The no action alternative was rejected because it does nothing to mitigate the risk of public exposure to the contaminants at the site. Cleanup of the surface debris would be accomplished (component of all alternatives); however, both the public health and environmental objectives would not be met, and the Biscayne Aquifer would remain contaminated above acceptable levels. Additionally, the no action alternative does not mitigate other exposure pathways, such as direct contact, inhalation, and ingestion.

Only one ground water technology remained after the technologies screening, thereby establishing this technology as the preferred technology. Of the remaining alternatives (Alternatives 2,3,4, and 6), the soils technology is implementable but not effective due to the presence of lead in the soils at the site. All these technologies are effective for reducing the levels of volatile organics in the soils but are not effective for reducing lead concentrations in the soils. In addition, incineration (Alternatives 4 and 6) is not considered cost-effective for use on such small quantities of soils, as well as not being effective for the incineration of metals contamination. Alternative 6 is not implementable as well because it involves incineration and disposal of the contaminated soils at another Superfund site. This is not considered administratively feasible.

#### IX. OPERATION AND MAINTENANCE (O&M)

When implementation of the recommended alternative is complete, long term operation and maintenance (O&M) will be required for the source control of the soils to demonstrate stability and resistance to leaching of the treated waste block. Long term maintenance of the cap will also be required. Once the ground water recovery and treatment program has restored the aquifer to the established water quality levels, periodic ground water monitoring will be required to ensure that long-term performance has been achieved. Should the ARARs for the ground water quality be exceeded due to the soils acting as a source, additional soil remediation will be performed. Long-term O&M for the ground water has been estimated at 30 years for costing purposes. The exact duration will be established during remedial design.

The estimated annual O&M costs are presented in Table 14. The annual O&M costs include those for environmental sampling and monitoring, energy, supplies and materials, labor and laboratory fees.

#### X. SCHEDULE

|  |       |
|--|-------|
| Issue Record of Decision to Public Repository----- | 9/87  |
| Issue Notice Letters with ROD to PRPs-----         | 10/87 |
| Completion of Enforcement Negotiations-----        | 2/88  |
| Start Remedial Design-----                         | 3/88  |
| Complete Remedial Design-----                      | 12/88 |
| Start Remedial Action-----                         | 1/89  |
| Complete Remedial Action-----                      | 12/90 |

#### XI. FUTURE ACTIONS

1. Gather environmental data that will define the extent of soil contamination at the GCO site and confirm the volume of soil requiring remediation. This effort will be sensitive to the different remedies for hardened waste sludges and metals-contaminated soils.
2. If necessary, pilot studies will be performed for the stablization/solidification portion of source control. The best mixture of soil to stabilization/solidification material will be determined by field-pilot studies. The reliability and effectiveness of the best ratio needs to be confirmed by bench-scale studies. The resulting mix of treated waste will be tested for leaching, permeability, unconfined compressive strength and wet/dry durability.
3. Additional ground water and aquifer studies will be required to define the contamination plume and aquifer characteristics for ground water recovery, treatment, and disposal. Ground water treatability studies will be performed, also, to determine the appropriate ground water treatment method.